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TREATMENT OF SEPSIS WITH BACTERIAL VACCINES

A REPORT OF 97 CASES. FROM THE PATHOLOGICAL LABORATORY OF THE MASSACHUSETTS GENERAL HOSPITAL

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THE cases which form the substance of this report have been infections, mostly acute, with various bacteria, the ordinary pyogenic organisms. They form a miscellaneous collection which can best be described under the general term of "surgical sepsis," and include such diverse cases as septic fingers and hands, septic laparotomy wounds, and septicæmia.

In a previous communication[1] the results of treatment of boils and carbuncles with bacterial vaccines have been given. Since this report was made, a still larger number of these have been treated, with like satisfactory results. No cases of this class are embraced in the following report. Besides these a number of cases of surgical tuberculosis, gonorrhœal arthritis, and infections of the bladder and kidneys have been treated. These cases, too, are not included at this time, but it is proposed to make them the subject of a future communication.

As our cases have been studied from the clinical point of view only, they have been classified from the clinical rather than the bacteriological standpoint; the success or failure in treatment seeming to depend on the condition of the case and the severity of the infection, rather than on the variety of the infecting organism.

[1] Boston Med. and Surg. Jour., vol. clvii, p. 523.

In every case the pathogenic organism was determined by culture, and in the majority an "autogenous" vaccine was used. In some two different vaccines were employed where it seemed probable that there was more than one offending bacterium. The vaccines were made up according to the method devised by Sir A. E. Wright, somewhat modified as described in Mallory and Wright, Pathological Technique, Fourth Edition. The amount of inoculation varied with the micro-organism and with the nature of the infection. The initial dose was from 5 to 25 million, and this amount was gradually increased at each successive inoculation, as it is assumed that an increasing tolerance was attained. The maximum amount given was usually 100 million, although this was sometimes exceeded. In all cases except the general infections, an arbitrary interval of 3 days was made between each two inoculations, that is, they were given every fourth day. Other spacing may be more effective, but this was followed in the boils and carbuncles, and seemed to afford the most satisfactory results. In the general infections they were given more frequently, and the doses as a rule were smaller, as there seemed to be a diminished tolerance for larger amounts. The clinical symptoms were followed, a rise in temperature following a drop after inoculation, being an indication to reinoculate.

Occasionally as the dosage was pushed up, reactions were seen. They consisted usually in slight headache and backache accompanied in the more severe cases by nausea, sometimes by vomiting, with chills, and a rise in temperature of a degree or two. They followed several hours after inoculation, and would disappear in a few hours. These reactions were rare, and as far as known, were followed by no ill effects. Whenever they occurred, the amount of the inoculation was reduced so as to avoid a repetition. Local soreness at the site of the inoculation was usually noted, as described in our previous report.

Surveying our cases as a whole, it seems that the bacterial vaccines are of varying usefulness in these septic cases. In some, evidence of their value is clearly shown, while in others they were apparently without avail, in stemming the flow of sepsis. All received constant surgical attention, and the effect of the vaccines is therefore clouded; a more thorough drainage, or the opening of a pus pocket, producing similar results which we expect from a successful inoculation.

To facilitate a more detailed study, we have divided the cases into five groups:

I.	The General Infections	24 cases
II.	Septic Abdominal Wounds	22 "
III.	Local Sepsis	41 "
IV.	Empyema	6 "
V.	Osteomyelitis	4 "
	Total	97 "

Group 1 comprises 24 cases, 18 of which were puerperal infections. All of these 18 cases recovered. In 4 blood cultures were made; one showed streptococcus pyogenes; one staphylococcus pyogenes aureus; and two were negative. Fifteen showed streptococcus from the cervix in pure or nearly pure culture.

Brief histories of some of these cases follow:

CASE 160674. Massachusetts General Hospital. Oct. 14, 1908, entered hospital with following history: 18 years old. Three weeks ago a normal primiparous labor. Five days after labor temperature rose to 105° F., with a foul vaginal discharge. Three days later was curetted, and since then the temperature has ranged from 100° to 105° F. Has been able to take very little nourishment because of vomiting.

P. E. Well developed and poorly nourished. Tongue moist, with thick white coat. Over anterior aspect body numerous pin-point to pea-sized vesicles. Mentally bright and alert.

Præcordia. Heart not enlarged, systolic murmur over whole præcordia. Pulmonic second not accentuated. Pulse rapid, regular, low tension, and at times dicrotic. Lungs slight relative dullness over whole left front, with fine rales over front and back, more numerous on left side. Breathing front and back normal.

Abdomen negative except for slight tenderness low down in left lower quadrant.

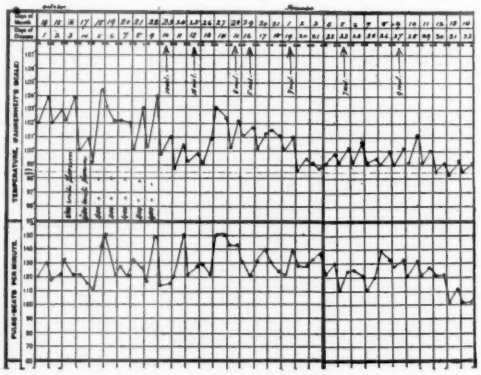
Vaginal examination, cervix lacerated and points in axis of vagina. Fundus not felt. Cul-de-sac negative. General tenderness throughout. Profuse vaginal discharge.

Oct. 15. Intrauterine douche, which was repeated for four successive days, till vaginal discharge ceased.

Oct. 16. Culture from the blood and from the cervix showed streptococcus, and she was given inoculations of streptococcus serum on six successive days.

Oct. 23. Her condition was alarming, the pulse was rapid and thready, and frequent vomiting allowed little nourishment to be taken. Given 10 million autogenous streptoccoccus vaccine.

Oct. 25. Very much improved. Vomiting stopped; takes nourishment better. Looks brighter. 15 million vaccine.



Patient No. 160674.

Oct. 27. Since last inoculation, temperature and pulse have risen, and a small pleural effusion appeared on left side. It seems as if the last inoculation had been too large.

Nov. 2. After 3 smaller inoculations, the temperature has gradually fallen. She appears much better, and now has an appetite. Condition of lung is the same.

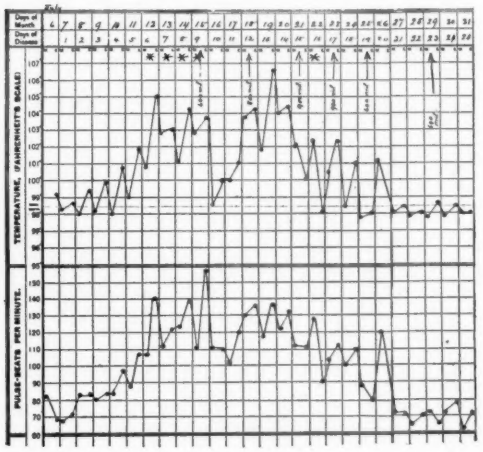
Nov. 7. With two further inoculations, has improved gradually, and the lung condition is clearing.

Further convalescence was steady and uneventful, and she was discharged on Dec. 16th. There was still dullness in left chest with a few crackles. Pelvic ex-

amination showed uterus in normal position without masses in either cul-de-sac.

(The arrows on the charts indicate the inoculations. The amount of each inoculation is expressed in millions. The asterisks at the top of the charts denote intrauterine douches.)

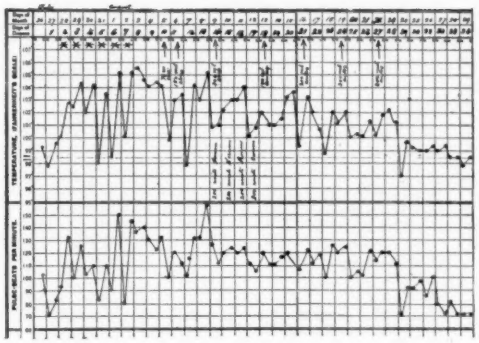
CASE 15119. Boston Lying-In Hospital. Primipara, 18 yrs. Normal labor. Sixth day developed high temperature with chills. Lochia foul and fundus tender. Curretted and given intrauterine douches without any change in her condition. Chills and high temperature continued and the pulse was rapid and weak, notwithstanding heavy stimulation. She was drowsy, although not actually delirious, and vomited nourishment. Cultures from the uterus and blood showed pure staphylococcus aureus. On the evening of



Patient No. 15119.

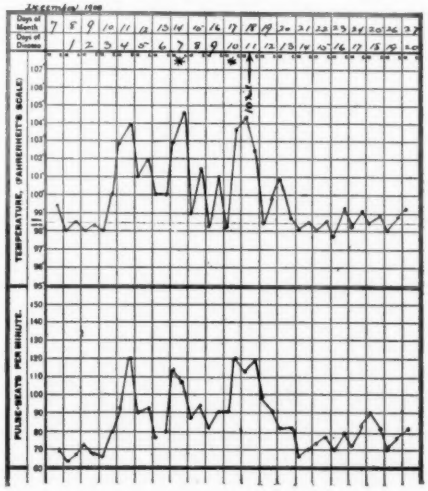
the ninth day, inoculated with 600 million "stock" vaccine. The following morning the temperature was normal, the lochia sweet, light in color, and less profuse. During the next four days her condition relapsed somewhat, with chills on the thirteenth and fourteenth days. Two inoculations on the twelfth and fifteenth days, and the stormy symptoms again subsided. On the twenty-first day, after two further inoculations, the temperature fell to normal and remained there during the rest of her stay in the hospital. She was discharged on the thirty-second day.

CASE 15152. Boston Lying-In Hospital. Primipara, 20 years. Normal labor. On the second day a chill, with temperature 102.6° F. Lochia was sweet and there was no abdominal tenderness. She was stimulated and given intrauterine douches. A culture from the uterus showed an abundant growth of pseudo-diphtheria bacilli, with a slight growth of streptococci. Two successive blood cultures were negative. The streptococcus could not be isolated from the culture,

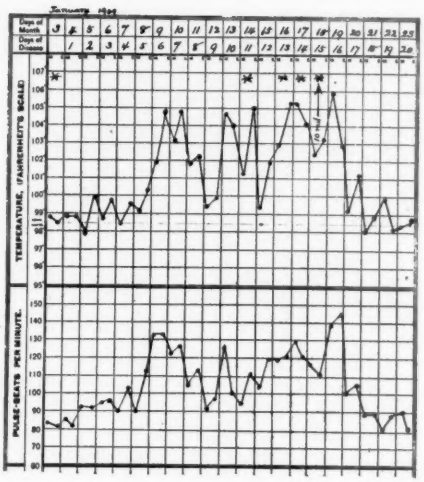


Patient No. 15152.

and on the tenth day she was given a "stock" streptococcus vaccine. This produced little effect on the general condition, and she was given four doses of "Aronson's" streptococcus serum on successive days without apparent result. Thus on the 17th day she presented the picture of profound sepsis: the face flushed, the eyes sunken, the tongue dry, and pulse rapid and weak. She slept but little and could retain but a small amount of nourishment. There was a large, indurated mass filling the left side of the pelvis, not tender and without definite bulging. The uterus was of normal size and very little displaced. On the eighteenth day she was inoculated with 100 million pseudo-diphtheria vaccine and three days later with 200 million. In the next thirty-six hours the temperature steadily fell to normal and there was a marked improvement in the general condition. She received



Patient No. 16275.



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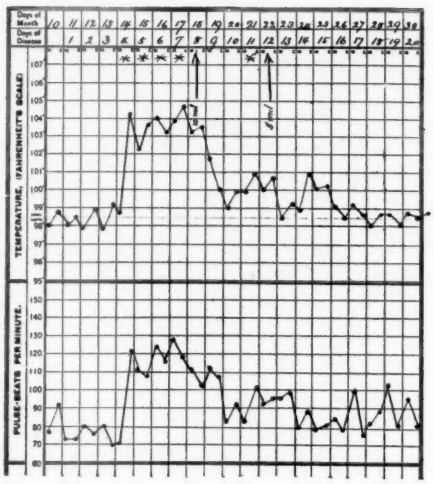


Patient No. 16279.

two further inoculations, with continued improvement. The temperature fell to normal on the thirty-third day and remained there, and she was discharged on the forty-first day. Vaginal examination showed a dense mass filling up the left side of the pelvis and encroaching on the base of the bladder, with a smaller mass on the right side. There was no tenderness. The uterus was displaced backward.

CASE 16275. Boston Lying-In Hospital. Primipara, 21 yrs. Normal delivery. Rise in temperature on the third day. Culture cervix streptococcus. Seventh day curetted with removal of retained membranes, and given intrauterine douche. Tenth day intrauterine douche. Eleventh day inoculation "stock" streptococcus vaccine. Improved rapidly and discharged on the twentieth day.

CASE 16337. Boston Lying-In Hospital. Primipara, 24 yrs. Normal delivery, manual extraction of retained placenta. Sixth day high temperature, with symptoms of infection. Culture cervix streptococcus. White count 20,000. Uterine tenderness. Fourteenth day curettage and douche brought away considerable membranes and pus with improvement and drop in temperature. Temperature rose again and did not fall with repeated douches. Fifteenth day "autogenous" vaccine. Fall in temperature during the next 24 hours. Convalescence uneventful.

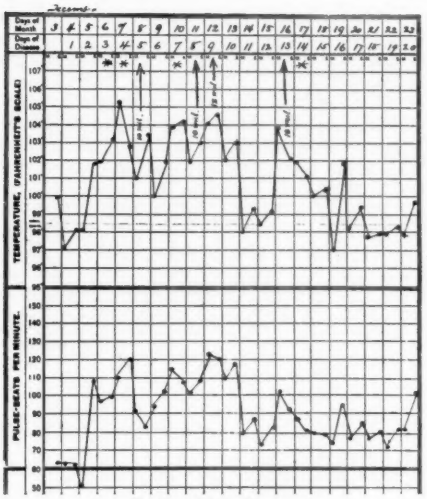
CASE 16279. Boston Lying-In Hospital. Primipara, 23 yrs. Normal delivery. Fourth day chill with rise in temperature. Culture cervix streptococcus. Retained membranes curetted out, and douches on four successive days. Condition little changed. Eighth day "autogenous" vaccine, with succeeding improvement, and again on twelfth day with steady convalescence.

In some of the cases of puerperal infection, the effect of vaccine on the temperature and general condition was less striking than in the preceding. These were cases in which abscess had formed, probably in the tubes, and they did not clear up until the pus was discharged by vagina. The following illustrate this type:

CASE 16270. Boston Lying-In Hospital. Multipara, 26 yrs. Normal labor. Third day rise in temperature, later developed mania. Cervix streptococcus. Little obtained by curettage. Four inoculations "autogenous" vaccine. Condition did not clear until cervix dilated with free drainage of pus. Discharged in good condition, with slight mental cloudiness.

CASE 16150. Boston Lying-In Hospital. Primipara, 32 yrs. Foot presentation, breech extraction. Third day rise in temperature. Cervix predominating streptococcus with B. Coli. Curettage with slight amount of detritus. Abdominal tenderness with induration in both cul-de-sacs. Six inoculations of "autogenous" streptococcus and repeated douches. Sixteenth day temperature fell, general condition improved, abdominal tenderness disappeared, and further course normal.

CASE 16293. Boston Lying-In Hospital. Primipara, 23 yrs. Normal labor. Third day rise in temperature. Cervix streptococcus. Right sided abdominal tenderness with mass in right cul-de-sac. Uterine curettage without result. Two inoculations of "stock" streptococcus and five of "autogenous." Thirteenth day free discharge of pus from cervix. Steady convalescence.



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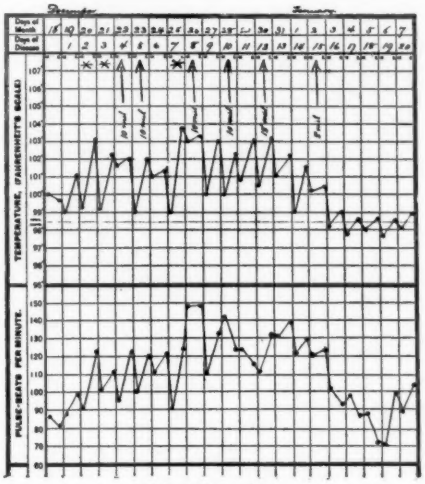
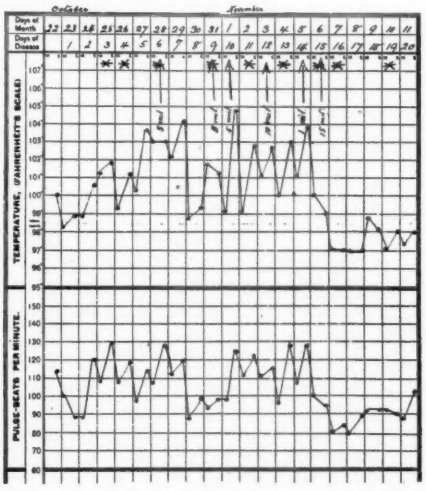


Patient No. 16293.

CASE 16235. Boston Lying-In Hospital. Primipara, 23 yrs. Normal labor. Fourth day rise in temperature. Lochia foul. Curettage with removal of considerable clot. Cervix streptococcus. Distinct right sided abdominal tenderness. Four successive intrauterine douches. Six inoculations "autogenous" vaccine. Free discharge of pus after dilatation of cervix. Seventeenth day temperature remained normal and abdominal tenderness disappeared. Further convalescence normal, and discharged with retroversion.

CASE 16225. Boston Lying-In Hospital. Second pregnancy, 22 yrs. Normal labor. Second day rise in temperature. Curettage with douche brought away membranes, but no effect on condition. Cervix streptococcus. Tenderness in both lower abdominal quadrants. Sixth day "autogenous" vaccine. Fall in temperature with diminution of abdominal tenderness. Five further inoculations. Free discharge pus from cervix. Temperature remained normal on nineteenth day, and abdominal tenderness disappeared. Convalescence steady.



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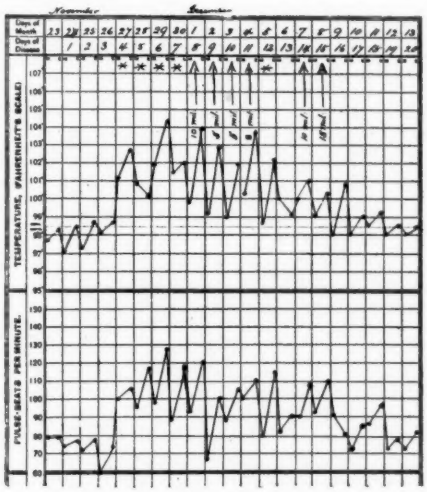

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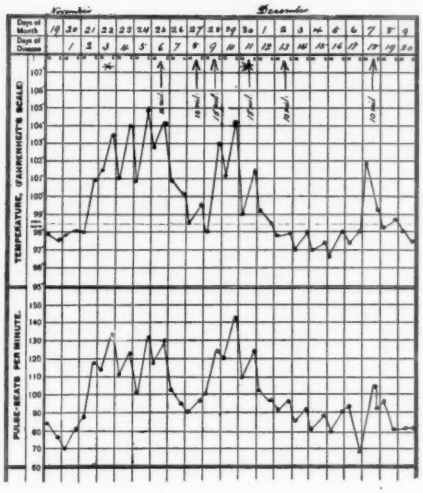


Patient No. 16225.

Besides these puerperal patients, 9 general infections were treated; 4 were staphylococcus aureus and 5 were streptococcus. Four of these 9 progressed to a fatal termination. Of those that recovered, we do not think the vaccine can lay claim to any further share in the successful outcome than the complete surgical treatment which was followed.

The second group, septic laparotomy wounds, comprise 22 cases. Nine of these were clean cases, which were infected secondarily; the remainder were septic and were drained from the beginning. B. Coli and staphylococcus aureus were the organisms most frequently found, streptococcus came next, while one showed the pneumococcus. Where the staphylococcus aureus was found, a "stock" vaccine was used, with the others an "autogenous."

In some of these cases, where the wounds had remained stationary for some time, improvement seemed to follow immediately after vaccine, but we cannot assure ourselves that this was the invariable experience. The two following cases illustrate the successful result of inoculations:

CASE 150996. Massachusetts General Hospital. Male, 54 years.

Jan. 6, 1907. Appendectomy without drainage.

Jan. 19. After violent coughing, abdominal wound burst open. Immediately sewn up. Clean, but showed little healing tendency.

Jan. 22. Wound septic and opened widely. Much discharge and a large amount of sloughing tissue.

Jan. 30. Patient listless and apathetic. Wound edges indurated with only a few drops of pus. Culture, staphylococcus aureus. 450 million "stock" aureus.

Feb. 3. Patient much brighter, eats well. Wound much cleaner.

Feb. 28. Discharged with superficial granulating wound.

CASE 158586. Mass. General Hospital. Female, 42 yrs.

May 25, 1908. Crile's operation for procedentia.

June 16. Upper end of abdominal wound laid open for sepsis.

July 7. Whole wound has broken down, its edges are indurated, and there is a profuse discharge. Slight rise in temperature, culture predominating colon bacilli with streptcococci. 25 million "autogenous" colon.

Three more inoculations were given. Temperature remained normal after the second. Wound cleaned up rapidly.

July 22. Patient was discharged with superficial granulations.

No one of this group was dangerously sick, and they were all discharged from the hospital in good condition, after a variable time spent in convalescence. Most of them have been seen or heard from some months after their discharge, and have shown the usual post-operative results, without anything which could be ascribed to sepsis. If we take the orginally clean cases, where the infection was limited to varying depths in the operating wound and did not extend into the peritoneum, we find that the average time from the opening up of the wound, until it had cleaned up and healed strongly enough to let the patient out of bed, and thus to be discharged, was slightly over three weeks. Of the 12 cases which were drained from the beginning, 2 were operated for pelvic abscess, 2 were septic gall-bladders, 3 appendix abscesses, and 2 septic nephrectomies. The average time of these 9 from operation until discharge from hospital was a little under 5 weeks, and they all had clean granulating wounds at their discharge. Of the remaining 3, one a pelvic abscess, first opened retro-peritoneally, later through the vagina. Two months after first operation, when thoroughly septic, given 9 inoculations of "autogenous" colon vaccine, during 4 weeks; improved so much at the end of this time that

she could be sent home, and a year after operation reported herself well; another, a large abscess in a man 21, opened retro-peritoneally healed up 5 weeks after operation, while given "stock" staphylococcus aureus vaccine; the third, an appendix abscess, opened 4 months previously in another hospital, with multiple discharging sinuses, showing staphylococcus aureus, healed up in 6 weeks while under vaccine.

In the third group we have considered the local sepsis. There are 41 cases in this group, largely septic fingers and hands, with some of the lower extremities, including the groin, and a few of the head and neck. Twenty-five of these were infections with the streptococcus, while the remainder were staphylococcus aureus and B. Coli, with 4 in which the bacteria were unclassified. Following the usual routine, "autogenous" vaccines were given in all except where staphylococcus aureus was found.

These cases represent a class of varying degrees of sepsis. They all recovered, some after extensive incisions and some after mutilating operations. In those which involved deep-seated structures, such as the tendon sheaths and the synovial bursæ of the hand and wrist, and the fascial planes of the lower extremity, we were unable to see that the vaccines contributed much to the successful outcome, accomplished by wide incisions and the use of antiseptics. Those of our cases which have reported, all show the after results of such infections, in the shape of fibrous adhesions of the joints and tendon sheaths and amputation stumps. Some few of the cases in which the intensity of the sepsis had apparently run its course, and which were left with a smoldering process in which little progress had occurred, seemed to be stimulated by the vaccines to a speedy resolution. We will mention briefly a few examples.

CASE 157752. Mass. General Hospital.

Apr. 2, 1908, entered the hospital with history as follows: Male, 42 yrs. Always well until five weeks ago, when he was seized with sudden pain under left arm, on returning home from work. During the night had a chill. Later an abscess developed under the left arm. It was opened by his physician and has been discharging since. A little later the left knee became painful and swollen. It was aspirated and a turbid fluid was obtained. Has been aspirated twice since. Two weeks ago abscess developed in right buttock, which was opened. During all this time he had chills and fever, and became very weak. Has had no cough.

P. E. Showed a thin, emaciated, bed-ridden man.

Heart and lungs normal.

Abdomen sunken with prominent iliac spines.

Below outer half of left clavicle, over second and third ribs, a granulating wound with a discharging sinus. There is an abscess in right buttock the size of fist, with two openings from which there is a thick purulent discharge. The left knee is swollen, the skin over it is hot but not reddened. There is no induration in the popliteal space. The patella floats, and there are two small wounds to its inner side, which mark the sites of previous aspiration. Culture from abscess, chest wall, and buttock shows streptococcus with staphylococcus aureus. About 2 ounces of turbid fluid obtained from knee by aspiration showing pure streptococcus.

There was no temperature.

Apr. 6. Under ether anæsthesia knee joint laid wide open by two lateral incisions, and about 2 ounces of dark brown fluid obtained. Joint washed with Harrington's solution and normal salt, and rubber drainage tubes inserted. Knee put on a ham splint with dry dressing. Abscess on buttock laid wide open, and packed with iodoform gauze.

Apr. 7. There is a profuse discharge from abscess on buttock, and a slight thin discharge from knee.

Apr. 12. Cigarette drains substituted for rubber tubes in knee.

Apr. 13. 25 million autogenous streptococcus, and three further inoculations given every fourth day.

Apr. 15. No discharge from knee, wicks removed.

Apr. 19. Improved very much in general condition. Ham splint omitted, and wounds of knee healed. About 15 degrees of passive motion. Buttock clean and granulating.

Apr. 27. The last two days about the ward on crutches. Knee can be well flexed. Clean granulating wound on buttock $1\frac{1}{2} \times 1\frac{1}{4}$ in. Patient discharged to his own physician.

CASE 108021. Mass. General Hospital. Out-patient. Male, 43 yrs.

June 10, 1908. Septic wound of index finger received two days previously, extension into palm with lymphangitis up arm to elbow. Deep incision made over finger and palm of hand.

July 8. Wound in hand discharging. Two deep abscesses on leg opened, one at junction of middle and lower thirds, and the other over ankle. Pus showed streptococcus. In poor physical condition, 40 pounds below normal weight.

July 9. "Autogenous" vaccine started.

July 20. General condition greatly improved. Wounds on leg healed, hand wound closing.

July 24. Small pieces of necrotic bone from second metacarpal removed.

August 11. Hand healed. Discharged.

CASE 160667. Mass. General Hospital. Male, 23 years.

Oct. 14, 1908. Entered hospital with recent bullet wound of thigh, and bullet extracted.

Oct. 19. Tract of bullet, extending to bone without any bony injury, opened widely. Culture staphylococcus aureus.

Nov. 23. "Stock" vaccine begun.

Nov. 27. An irregular septic temperature dropped to normal and remained there. Wound discharging less and rapidly healing.

Dec. 3. Patient discharged with clean granulating wound.

CASE 162726. Mass. General Hospital. Female, 16 years.

March 9, 1909, entered hospital with history of a small pustule behind right mastoid 5 weeks ago. Under ether, was incised by her physician. One week ago right ear swollen, felt feverish. Stopped work and in bed since. Status, posterior to right mastoid a dirty sloughing wound, 1½ inches long. Right ear swollen, with blebs. Erysipelas over forehead. Blood culture negative. Culture blebs streptococcus. Erysipelas spread over both sides of face, and later the whole scalp became infiltrated, and numerous pustules formed which showed streptococcus.

March 22. "Autogenous" vaccine begun. An irregular septic temperature, which had been gradually falling, fell to normal after the first inoculation, and remained there. The infiltration in scalp rapidly subsided and the sloughing wound cleaned up.

March 29. Sent to Convalescent Home with a small discharging sinus behind right mastoid.

Group IV includes 6 cases of empyema; and group V, 4 of osteomyelitis; but we can not see that any benefit was obtained in these cases from inoculations.

We conclude therefore:

1. That bacterial vaccines should be further employed in puerperal infections which do not immediately respond to routine treatment.

2. That bacterial vaccines are of much value in that type of sepsis which has remained stationary for some time, as illustrated by a few of our septic laparotomy wounds and a certain number of our cases of local sepsis.

3. That in the remainder of the cases of this series we have not been able to see that the vaccines are of any apparent help.

We wish to express our indebtedness to the respective staffs of the Massachusetts General and the Boston Lying-In Hospitals for the opportunity to study and report these cases, and to Dr. James Homer Wright and Dr. Oscar Richardson for much valuable assistance.

MEMBRANOUS PERICOLITIS[1]

BY JABEZ N. JACKSON, A. M., M. D., KANSAS CITY, MISSOURI

THE terms "pericolitis" and "perityphlitis" were found rather frequently in the literature beyond a quarter of a century ago. They were applied practically to all forms of peritonitis which happened to localize about the cæcum and colon, regardless of the original source of the infection, or the character of the peritonitis found present. In fact the pathology which antedates the dead house was so little known that practically all peritonitis of the right side of the abdomen was traced to the cæcum or to the colon as the essential starting place. With the discovery of the fact that in the vast majority of these cases the appendix was the real original offender, our ideas and methods were so radically changed that the old terms pericolitis and perityphlitis practically entirely disappeared from literature. We now usually speak of these pathological conditions either under the name of the original local lesion, as appendicitis, when such origin can be determined, or as localized peritonitis of varying type when the initial lesion can not be determined. Practically, therefore, all these peritoneal lesions of the right side of the abdomen are looked upon as either the immediate effects or the remote result of some *acute* present or antecedent inflammation generally originating in the appendix. Wherever, therefore, we find any late manifestations of peritoneal disturbance about the colon we have been content to label it "adhesions," presume an antecedent acute appendicitis, and pass on. Some very striking and not infrequently re-

[1] Read before the Western Surgical Society at Minneapolis, Minnesota, December, 1908, with revisions and additions from observations to June 1, 1909.

peated observations occurring to the writer now over a period of nearly seven years have persuaded him that there is a most interesting pathological condition occurring about the right colon which can not thus readily be set aside. This condition presents a rather striking pathological picture of its own. The composite observations of now quite a fair number of personal cases have convinced us likewise that this condition has a most pronounced clinical picture of its own. And further, we are of the opinion that for this condition some especial surgical treatment must be devised. To this end we have applied certain new methods in now seven cases which we will present for what they are worth.

In the outset we wish to disclaim any notion of having discovered or invented any new disease. We are sure that this condition has been observed, possibly frequently, by every surgeon of experience. Thus far, however, we do not think it has been either properly described from the pathological side, or recognized as a clinical entity, neither has it received any special surgical consideration. As a possible incentive to further studies this paper is therefore presented; as an observation and not as an argument.

PATHOLOGICAL DESCRIPTION

The following description of this condition is presented from the report of Dr. Frank Hall, pathologist to the Kansas City General Hospital, from a specimen found in a post-mortem subject.

"The specimen of ascending colon which you have presented to me as a type of the pericolitis you have been interested in, exhibits the following gross and microscopic features: the specimen presents the caput coil with attached appendix, the ascending colon, and a short segment of the transverse colon.

" From a point just at the hepatic flexure to three inches above the caput there spreads from the parietal margin over the external lateral margin to the internal longitudinal muscle band a thin vascular veil in which long straight, unbranching blood-vessels course, most of which are parallel with each other and take a slightly spiral direction over the colon from the outer upper peritoneal attachment to the inner lower portion of the gut ending just above the caput. The appendix is not implicated in any way.

"Coursing with the blood-vessels are numbers of shining narrow bands of connective tissue which gradually broaden as they go and end in a slight fan shaped attachment at various points on the anterior and inner surfaces of the colon. At these points of attachment the gut is held in rigid plication.

" The entire specimen conveys to the eye the idea that an œdematous fluid lies beneath this delicate membrane and reminds one of nothing so much as an œdematous arachnoid so often encountered on removing the dura mater from the brain of a dead alcoholic. The colon seems placed in a diaphanous bag slightly too short to contain it without wrinkling. At the beginning of the hepatic flexure the drawn membrane particularly angulates the contained colon. Here and there are spots and tags of fat beneath the cobweb. On handling the specimen the colon slips about in its bag without entire freedom as a fœtus within its amniotic sac. A portion of the parietal peritoneum has been removed with the colon and shows that the membrane and blood-vessels arise in and are continuous with the structures of the parietal peritoneum, as it sweeps over the colon. The entire structure seems to be peritoneum, loosened from its close connection to the abdominal wall and colonic surface by some serous exudate after which the particular vascularization and connective tissue banding has occurred as a chronic reaction to irritative influence.

" Miscroscopic sections prepared from blocks of tissue cut entirely through to the lumen of the colon present, first, a very loose external covering, a normal musculature, a broad submucosa, and a normal glandular coat. Our chief interest lies in the serous coat which is seen to have its fibers split asunder as if by a serous infiltrate, thus lifting the endothelial layer of the membrane which is clearly demonstrated to exist as a covering over all. The blood-vessels present in cross section and are unusually large and thin walled. Wherever a blood-vessel courses there also is a condensation of the white fibers into bands parallel to the vessel. The general aspect of the region under discussion is that of a mass of more or less iso-

lated fascicles of white fibrous tissue with here and there a blood-vessel filled with blood, broad clefts lined with endothelium, and a few fat and connective tissue cells sprinkled here and there.

"No fibrin, polymorphonuclear leukocytes or other evidence of inflammation are present. The connective tissue next to the layer of longitudinal muscular coat is condensed and seems to penetrate in increased amount between the muscle bundles. Aside from this questionable matter, the gut and its walls are normal. The endothelial covering in places on the surface is perfectly preserved and demonstrates beyond a doubt that we have here no new or false membrane but simply a rarefied and otherwise altered natural structure. The enlargement of the endothelial lined clefts so abundantly observed suggests a chronic lymphstasis as an associate condition which is possibly a key to the formation of the amount of fluid in the tissue spaces of the peritoneum."

In addition to this description we would add some observations of the condition as observed now in quite a number of living subjects seen in the course of surgical operations. The transparent, vascularized veil appearance of the membrane strikes one's attention very forcibly, with the parallel bright red vessels running with the long axis of the ascending colon. In some instances it appears as though the membrane came on to the colon from the lateral parietal wall just above the cæcum and courses directly upward to disappear beneath the liver on the superior layer of the transverse mesacolon. In other instances it seems attached like an adhesion to the under surface of the liver well anterior to the normal peritoneal reflection. Again in other cases it appears as though it had begun above and descended on the colon to its termination usually just above the cæcum. Again we have seen it pass across and upward to the transverse colon which in one instance was apparently drawn down by the membrane practically paralleling the ascending colon to the level of the cæcum. In this case the gastric symptoms were marked as a result of the mechanical gastroptosis thus produced. In one instance this membrane was so dense as to lose entirely its apparent vascularity and transparency and looked like a solid sheet of organized fibrous tissue beneath which the ascending colon was so lost that it could not be seen at all until the membrane was divided and brushed aside when an apparently normal though contracted colon became evident. In no instance does this membrane resemble our ordinary conception of an adhesion. It is never adherent to the abdominal wall nor to any contiguous loops of small intestine. Instead it resembles more closely than anything we can describe, a thin pterygium. In recent cases the membrane is quite free and produces but limited restriction to the underlying colon. In more advanced and characteristic cases it seems to bind the colon close to the abdominal wall and produces such marked angulations and convolutions of the colon as to practically produce a stricture of its lumen. In fact in one case seen in autopsy when a stream of water was caused to flow into the cæcum through the ileocæcal valve, the cæcum distended almost to bursting and yet none of the fluid would pass through the ascending colon and past the hepatic flexure until it was milked through with the fingers. It is also noteworthy that in the large majority of cases the cæcum was not involved in the membrane at all. Nor was the appendix invested except when it occupied an ascending position at the outside of the colon, when it was covered by the membrane as it was reflected on to the colon from the lateral parietal wall. The appendix in almost every case, however, was rather small and sclerotic. We have seen the membrane in one case in which there had been years before an appendicular abscess which was drained. In this case the cæcum was likewise markedly involved in the membrane. The angulation of the colon is generally most marked at the hepatic flexure. There is always a very loose space where the membrane can be easily picked up at the outer angle where it passes from the colon to the outer parietal wall.

CLINICAL SYMPTOMS

As we also observed in our introductory remarks, this interesting pathological condition is attended by an equally interesting and rather distinct clinical syndrome.

Our attention was first attracted to this condition in the course of an abdominal operation

now some six or seven years ago. A brief resume of the history of this case may be of interest. The patient had first come under our observation some three years or more before the time of our operating upon her. She was then a probationary nurse in the University Hospital, and I was asked to see her with a supposed attack of appendicitis. She gave the history of a number of previous attacks. In each she had suffered from pain and distress over her entire right abdomen, though more particularly referred by her to the site of the appendix. In none of these attacks had she had temperature or pulse disturbances; in fact none of the chartacteristics of an acute appendicitis or peritonitis. She had gone to bed, however, frequently for a day just from pain and discomfort. She said that she had never felt entirely comfortable in her right side for years, but did reasonably well except when these severer "spells" came on. She was a very attractive young woman in her personality and quite intelligent, though of a decidedly high strung temperament and somewhat neurotic. She described her symptoms very freely; in fact was more fluent than the average female is in portraying her complaints. We found her with a normal pulse and temperature. On palpation she complained of tenderness all over the right abdomen, was indeed quite hyperesthetic. There was no rectus rigidity. Her greatest tenderness she located about the appendicular region in general, but we could not focalize to a finger point. We fell in quite readily, however, with a diagnosis of chronic recurrent appendicitis and recommended operation upon her recovery from this "spell." There was no suggestion of urgency. When she got up, however, still being a probationer, the superintendent of nurses decided not to accept her in training, as she considered her too neurotic to make a satisfactory nurse. She therefore left the hospital and we did not see her again for three or four years. She then came again to Kansas City from her home in Iowa, where she had married and then lived, especially to consult us again. We then learned that in the interval she had been operated upon by a distinguished surgeon, whom we knew, and had had her appendix removed. She obtained no relief from the operation, however, and continued to suffer as before. A second operation was done and one of her ovaries removed. Still no relief, and with this history she returned to us. On examination, with the appendix and one ovary gone, we could find no explanation for her continued symptoms. She was therefore referred to one of our leading internists, who sent her back again saying that the other ovary was diseased and should be removed. We could not confirm this diagnosis ourselves, but she insisted upon relief and we consented to operate upon the diagnosis of our medical confrere. Operation disclosed the one remaining ovary perfectly healthy. A perfectly healthy broad ligament was found on the side from which the ovary had been removed. We then decided to inspect the site of the appendix. Here I found a perfectly smooth cæcum at the site where the appendix had been, with not the slightest adhesion of any kind. Above the appendix, however, indeed really above the cæcum about the colon, my attention was strikingly attracted to the condition with which this paper is concerned. Here I observed what looked like an entirely complete new layer of peritoneum, perfectly transparent, investing the colon from the cæcum to the hepatic flexure. This membrane was very loosely attached but moved freely over what appeared to be the normal peritoneal coat of the colon beneath. This membrane was also made striking by a large number of what appeared to be small capillaries, bright red in color, running as parallel pink threads in the direction of the long axis of the colon. These capillaries appeared to run in similarly parallel delicate strands of fibrous tissue. The whole tissue resembled very much a veil which moved rather freely over the face of the colon beneath. This membrane appeared to come on to the colon from the outer parietal wall into which it quietly faded away and above the hepatic flexure of the colon became lost in the transverse mesocolon. The membrane covered also the whole of the circumference of the colon and imperceptibly became lost in the inner side of the colon and the inner parietal peritoneum. The whole right colon was rather closely confined in the lumbar fossa and could not readily be pulled forward. Likewise it seemed distinctly shortened in its

long axis, and at places presented a pleating with the delicate fibrous strands of the investing membrane passing straight across from one fold to the other. It thus appeared as though the colon was restricted both as to the action of its circular and its longitudinal fibers and more or less immobilized to the posterior abdominal wall. There were no adhesions between the colon and any contiguous structure and the membrane did not strike us as analagous to an adhesion in any sense. It looked instead as we have described, as a new adventitious, vascularized, investing layer of peritoneum. At the time of this, our first observation, it impressed us as some sort of an anatomical freak which we in no way associated in our mind with the woman's complaints. We made no attempt therefore to deal with the membrane in any way, and with the simple observation of its peculiar appearance, closed the abdomen. The patient was of course not improved in the least by our operation, though we were satisfied now with a diagnosis of neurasthenia and placed her malady in her head and not in her abdomen.

In the course of years both before and since this case we can recall several cases of somewhat similar clinical picture in which we have operated with a diagnosis of chronic appendicitis and removed the appendix — but without the expected relief to our patient. These cases being always considered uncomplicated chronic appendicitis, were operated with a very small abdominal incision and the colon was not seen at all. The real condition in these cases is as yet conjectural, as we have had no opportunity to reoperate in any of them. In the light of other demonstrated cases, however, we now have a strong suspicion that this same pericolonic membrane could be found in at least several of them.

Following this interesting case, however, we have operated in several cases of somewhat similar type and with the diffused symptoms have been in doubt as to whether the trouble lay in the appendix or in the gall-bladder. In several such cases in order to expose both sites through one opening we have made a free right rectus incision midway which could be enlarged in either direction as found necessary. This incision thoroughly exposes the ascending colon. In several of these operations we have found both appendix and gall-bladder perfectly normal but to our surprise and interest, again observed this same peculiar pericolonic membrane.

In retrospective study of these several cases in which this membrane was found and by a species of composite photography we were gradually greatly impressed with certain striking similarities in the clinical histories of each of these cases scattered through years. These observations we have remarked to several of our surgical colleagues through the past few years, and becoming themselves interested in the subject they have been able to also confirm both the pathological picture presented and likewise its clinical characteristics. Finally from these repeated personal observations and with the corroborative evidence of these colleagues we became convinced that this interesting condition was susceptible of differential diagnosis. With this opinion we have since May, 1908, made this positive diagnosis in five cases, in each of which the diagnosis was proven by operation.

The pathological condition has also been observed in several other cases where the diagnosis was not made but could have been, I am sure, with a closer attention. In one of these cases there was a positive change in the appendix which was so large as my thumb, and thickened clear into the cæcum. The appendicular symptoms so overwhelmed the lesser evidences of the pericolonic membrane that it was not suspected, though further inquiry after operation disclosed their added symptomatology. In yet another case the membrane was observed incidentally in a patient operated upon for cyst of the broad ligament. This patient's history showed a previous acute appendicitis with abscess, which was drained without removal of the appendix. In this case there were no visceral adhesions at all; the appendix with its mesentery was free but small and sclerotic; and in this (the only case in which such has been observed) the membrane surrounded the whole cæcum.

In still two other cases a positive diagnosis was not made between this condition and ordinary chronic appendicitis. But in each of these cases the suspicion was sufficiently strong that we made a rather larger incision than we are

accustomed to make for simple appendectomy in order that we might inspect the colon. In these two cases the membrane was much more delicate than in the other cases observed; there were but few of the fibrous tissue strands with consequent slight impairment of the mechanics of the colon; they were both of short clinical duration and the picture was accordingly not clear.

In all, therefore, we have observed the membrane in nine cases operated upon within one year.

That we may gain a clearer conception of the clinical symptoms in this condition we will here take the liberty of introducing the clinical histories of four of the first cases in which we operated with a definite diagnosis in advance. To avoid the prejudice of personal impressions each of these histories has been written by others than ourselves.

CASE 1. This history is written by Dr. C. C. Conover, lecturer on Principles and Practice of Medicine in the University Medical College of Kansas City, by whom the case was referred.

"Mable N., age 28, single, twin, from a more or less neurotic family. Father living, not a very strong man, but in good health. Mother died from operation for gall-stones. Patient was in good health with the exception of constipation until 20 years of age. Eight years ago suffered an acute attack of abdominal pain, the seat of pain two inches to the left and one inch from the umbilicus; no vomiting; constipation continued. About one year later the patient suffered from a summer attack, pain in the same location as before; at this time two ounces of castor oil relieved all symptoms and she was soon in apparently good health again. Preceding this attack she was very constipated as before. From this time on, six to nine months apart, for the most of six years these attacks were repeated, and always under similar conditions, with the pain in the same location; no vomiting; constipation continuing. Attacks always relieved by cathartics. Two and a half years ago along with the attacks which continued as before, stomach symptoms were added somewhat in this order: constipation, hard to relieve; nausea and loss of appetite, flatulency, hyperacidity, severe pain in the same location, vomiting of sour smelling stuff. Morphine, oil-enema, rest in bed two days. This was followed by fairly good health. During the time, 1906, to '07, patient lost weight from 98 pounds, which was her normal, to 78. At the beginning of '08, constipation continuing patient, with other added symptoms, began to pass large quantities of mucus, and attacks came closer together. Between attacks abdomen was sore to touch even to clothing. Stomach very sour; headaches, poor appetite, general ill-health, weight in May, '08, 72 pounds. During March, April, and May, '08, alternate constipation and diarrhœa at intervals passing mucus, no pain preceding passing of mucus, no casts of bowel on examination. On physical examination, tender all over right abdomen, and epigastrium; gas distention particularly over right side and cæcum. Stomach distended and full of gas."

CASE 2. This case occurred in the practice of our colleague, Dr. George B. Norberg, Professor of Gynecology in the University Medical College, to whom we are indebted for this report.

Mr. T. F. W., age 45, height 5 ft. 11 in., weight 148, occupation farmer, residence, Missouri. Consulted me on May 16, '08, giving the following history: has been ailing about 14 to 16 years. To his best recollection the first attack started like a "summer complaint," followed by a diarrhœa more or less severe, for 4 to 5 years. During this time there has been much loss of flesh; appetite poor; he is extremely nervous and weak; he has been told that he had stomach and intestinal fermentation; there is much bloating after taking food; with a gradual onset of pain which reaches its height in about 2 hours and then begins to subside. Sometimes he becomes suddenly nauseated, but has never vomited to his recollection. The mouth and throat feel dry and he is stupid and sluggish.

His whole abdomen is tender and sore as if it had been bruised by external violence; the tenderness is especially great just to the right of umbilicus. Pain is less when bowels move frequently and usually is relieved by taking a cathartic. During all this time he has been taking treatment from reputable physicians and several charlatans, the latter always promising cure.

Recently his diarrhœa has been of the mucus variety. Very severe pain immediately after eating or drinking; depressed mentally and wants to die, if he cannot be cured. Diagnosis: chronic appendicitis.

Operation May 18, 1908, University Hospital. Incision in usual location and of usual length for an appendix operation. Appendix could not be felt with finger, neither could cæcum be outlined. Incision was enlarged to considerable dimension, when cæcum and lower end of colon, about 6 inches, were found to be entirely covered and bound down by a thin membrane (pseudo-peritoneum). This was ligated in sections with fine pyoktannin catgut and cut and stripped down until bowel was freed and could be raised out through abdominal opening. The appendix was long, kinked, and hard, but did not show signs of recent inflammation. This patient made a most speedy and perfect recovery. He left the hospital for his home on the 12th day. He could eat and drink without pain, and was extremely happy. His depressed mental condition seemed to take a sudden flight. He often remarked "that for years he would go to bed hoping he would go to sleep and never awake."

September 4, 1908, the first time I had seen him since the operation, when he visited me in my office, and gave the following report.

About three weeks after operation he was riding horseback (his horse trotting and pacing) and he felt a pain in upper part of abdomen. This became quite severe after he reached home and lasted three days.

He was relieved by taking a cathartic and has not felt it since. He eats heartily; does farm work, something he has not been able to do for years. He weighs 168 pounds, is strong, perfectly well. and extremely happy.

November 25, 1908, patient called at my office. Has been perfectly free from pain. Appetite good, bowels normal, sleeps well, and is extremely happy over his condition.

CASE 3. This case was referred to us by her physician, Dr. Davies of Emporia, Kansas, and the appended history was furnished by her husband.

"Your letter received and in accordance with your request herewith hand you statement of Mrs. R.'s condition and symptoms prior to your operation for period covering the last four years.

"The first trouble noticed in connection with the bowels occurred in March, 1904, when she was confined to her bed for six weeks with an attack of catarrh of the bowels. This illness took place shortly before we were married.

"We were married in May, and shortly after she became pregnant. During the time of her pregnancy, she had little or no trouble with stomach or bowels.

"Our baby was born in February, 1905. From that time until May 30, 1908, she was troubled more or less with severe pains in her stomach and right side, the trouble being more pronounced the week following her period of menstruation. There was much gas formed in the stomach which caused her to bloat so that at times it was impossible for her to fasten her clothes around her in the proper manner.

"May 30, 1908, she was taken with severe cramps in the stomach and bowels accompanied by gas. Her bowels moved very irregularly, the stools having a porous formation and a putty color, and being full of mucus. She would crave food and upon eating would have severe cramping of the stomach followed by a movement of the bowels. One afternoon during the second week in July she had a severe attack of cramps which lasted three hours, the bowels moving ten or fifteen times accompanied by severe vomiting. From this time on every particle of food taken into the stomach would distress her, especially any kind of fruit or vegetable. There was a great amount of gas on the stomach which caused much belching.

"About the middle of August her mouth became filled with a great many canker sores. She consulted a physician who prescribed washing of the stomach, this was used every morning for almost a month, without any beneficial results.

"From this time she ate nothing but poached eggs and cereals, also toast. Even these caused the stomach much distress for two hours or more after eating. The last week in September she was barely able to be out of bed and ate almost nothing. She tried malt, but with distressing results to the stomach. During all of this time she was extremely nervous. For a day or two at a time she would be fairly well, then for several days would be very bad.

"Upon the morning of October 7th, about nine o'clock she had an attack with her heart which continued to grow worse until about 1:30, when vomiting set in. At 2:30 she had a very severe vomiting spell after which her limbs became cold and numb, accompanied by blindness. She being unable to see anything for about twenty minutes. She had absolutely no control over any of her muscles during this time. The attending physician gave medicine every five minutes, and it took the combined efforts of three people rubbing her with alcohol for 40 minutes to restore circulation. The physician said her heart action was over 200 a minute, that the blood left the extremities and became centralized in the head and heart and stomach. She rallied from this attack and was taken to the hospital for an operation October 12th. I believe this covers the case to the best of my knowledge."

CASE 4. The history of this case was taken by my assistant, Dr. James P. Henderson.

Mrs. M., age 29, residence, Kansas City, Kansas. Father living, very good health. Mother died at the age of 30, cause of death, childbirth. Three brothers living, all in good health. None dead. No sisters.

This patient had most all of the common diseases of childhood, such as measles and whooping cough.

Her first menses began at the age of 13. She complained of a great deal of trouble (pain). This period lasted a week and was regular so far as she remembers These periods were regular until the birth of the first child. During all this time she complained of pains and was more or less nervous. This patient has been married for ten years. She has had two miscarriages. The first one not giving her very much trouble, but felt weak and pain in the lower abdomen. The last miscarriage gave her a great deal of trouble, and the afterbirth had to be removed with instruments. She remained in bed about twelve days during this time. She had a great deal of pain in the abdomen, felt very weak and extremely nervous. Since this last trouble she has had no irregularity of the monthly periods.

PRESENT HISTORY

She first noticed this trouble nine months ago, or in March of 1908. She suffered a great deal with severe frontal headaches which radiated over the forehead and to the temple region, and at times she complained of occipital headaches. This occipital headache was continuous and even got worse in time. At the same time she complained of pain all over the abdomen more especially deep in the right side. This pain was cutting in character, and, as she said, "like sticking or cutting of a knife." She called these "kind of spells." At the same time she had griping pains all over the abdomen. Both the pain and the griping seem to get worse more especially when on her feet for any length of time and climbing stairs. There was backache across the small of the back; there was pain here most of the time. This pain seemed to get worse at her monthly periods. The pain in her side would also get worse when lying on right side, or on back, and then turning over quickly to either side, or start to get up suddenly. About the middle of May she noticed that she would increase in size at the waist, and there was some bloating and belching of gas and passing of gas by the bowels. At this time she said she was very nervous indeed. Could

not sleep very well, and she could not find anything to eat that seemed to agree with her.

About three months before operation and especially at her monthly periods, the pain bloating, headache, and backache would get worse, and after meals and in the morning early and very late at night she would complain of feeling full. After eating there was a pain in the upper part of the abdomen that felt like coals of fire to her. She was always constipated; no history of diarrhœa until about four months before operation. Yet she thinks that she passed mucus by bowel. There is no history of any blood being passed by bowel. She complained of a great deal of bladder trouble such as frequent urination and a great deal of burning.

Diagnosis: Laceration of perineum. Endometritis. Membranous pericolitis.

Operation: First perineorrhaphy; dilatation of cervix; curettement; appendectomy; plastic excision of pericolic membrane."

From these clinical histories which were duplicated in essential details in all other cases, we formulate the following clinical syndrome.

1. *Pain.* In every case pain of some sort has been the dominant symptom which has led them to be referred to a surgeon. Sometimes this pain is quite severe, sometimes no more than distinct distress. This pain or distress usually has a fixed time of origin and is progressive in its development though ofttimes in the early stages with remissions of comparative comfort for variable periods. Later the pain or discomfort is practically constant though marked by periods of acute exacerbations ofttimes requiring morphine for relief. This pain is referred pretty generally to the whole right side of the abdomen and can not well be localized to a particular spot.

2. *Tenderness.* This tenderness amounts as a rule to a hyperæsthesia and ofttimes is such as to render the pressure of clothing quite unbearable. Like the pain it is diffused pretty well over the right side of the abdomen, though more marked frequently at McBurney's point and just below the ribs. These particular points generally lead the practitioner to refer the cases to a surgeon with the diagnosis either of appendicitis or gall stones. The rather distinct localizing symptoms of the latter conditions are, however, lacking.

3. *Constipation.* Constipation is always marked, particularly in advanced cases and large doses of any cathartic are required to secure evacuation of the bowels. The thorough emptying of the gut, however, usually affords distinct but transitory relief.

4. *Mucus.* Mucus discharges from the bowels occur rather frequently, particularly in advanced cases. This symptom, however, is not always elicited except on direct inquiry, but then it is usually obtained.

5. *Gas.* Gaseous distention is marked, particularly in the exacerbations. It is most marked over the cæcum, which is ofttimes greatly distended. The patient particularly notices this bloating, as they designate it, which ofttimes makes the constriction of clothing particularly distressing.

6. *Loss of weight and tone.* As the symptoms progress the patient loses flesh quite perceptibly. With this loss of weight is a similar loss of tone. The patient becomes weak, the facial expression shows depression and ofttimes distress, the color becomes sallow and the general picture of intestinal auto-intoxication is complete.

7. *Gastric symptoms.* Frequently fermentative stomach symptoms are added and are not relieved by any dietary plans or the use of digestive aids.

8. *Neurasthenia.* Finally the patient becomes markedly neurasthenic, ofttimes almost melancholic. All symptoms are exaggerated, and it would take volumes to record their chronology of complaints.

9. *Treatment.* The use of cathartics and enemas gives some transient relief in these cases, but without permanent improvement. Attention to diet and efforts to minimize intestinal fermentation are also of benefit, but are not curative. The removal of the appendix and the drainage of the gall-bladder have been operative sources employed through mistaken diagnosis but without any relief to the patient. Many have, therefore, after prolonged treatment and ofttimes operation, been passed up as simple neurasthenics and condemned to continued suffering without any relief to the patient.

To attempt to find something which might be of some benefit to these distressed sufferers has been our effort in these nine cases which we have observed within the past year.

Synchronously with our recognition of the distinct pathology and clinical identity of this

condition, we had been impressed with the view that this pericolonic membrane by its mechanical interference with colonic peristalsis was possibly, if not probably, responsible for the chain of symptoms which were manifest when it was found present. Under this theory the pains are readily explained by the traction transmitted to the sensitive parietal peritoneum when gas or fæces attempt to pass through this anchored area. The gaseous distention and flatulency are likewise easily explained by the impediment to their passage through a restricted lumen. Constipation becomes evidently necessary where the peristalsis is so markedly interfered with by the contracted fibrous tissue strands of the membrane with the increased element of resistance from convolutions, angulations, and kinks which almost obliterate the lumen entirely. The mucus discharges from the bowel are equally susceptible of explanation, and with all the conditions of intestinal toxæmia added the patient should become neurasthenic.

At the same time with the observation of the mechanical elements of this membrane we were also impressed with its apparently distinctly detachable nature and had formed the opinion that with little difficulty it could be entirely dissected off the colon and removed. We were also impressed with the fact that beneath this membrane the colon had a separate normal peritoneum of its own or a membrane so similar in its characterization that it would perform a similar function and thus not invite other possibly worse adhesions after the membrane was removed. On these assumptions we have in these cases of the past year proceeded with the following technique:

Operation. The right colon is exposed by an incision near the outer border of the right rectus muscle from McBurney's point upward to the costal margin. The colon is drawn toward the midline and the membrane exposed where it is reflected to the parietal wall. Here it is divided, usually after clamping along the parietal line and subsequently ligating. The cleavage established, with gauze the entire membrane is readily stripped toward the midline upward and downward. As it reaches its point of colonic fixation it tears loose readily and can be removed in a sheet as large as one's hand. At a few points of its attachment to the colon there will be a little oozing of blood, requiring clamp and ligatures in a few points but most vessels spontaneously cease bleeding. Clamp and ligatures are used where deemed advisable. When the membrane has been cleared off the colon becomes freely movable and its length is apparently almost doubled. Angulations now disappear. The outer layer of the gut now looks much like a normal peritoneum with a few oozing spots and some shreds of loose connective tissue with little islets of fat. After all constricting membrane is detached and the oozing points controlled, we wash with hot normal salt solution, return to abdomen, and close as usual.

Results. This surgical idea has been carried out in seven of the nine cases observed in the last year. One of the remaining two cases was strikingly different from all the others, and a different surgical procedure was deemed expedient. In this case the membrane instead of being like a transparent, vascularized veil was thick like a sheet of paper and perfectly opaque. In fact, when we first looked into the abdomen in this case we could not see the ascending colon at all until this thick membrane was split and bluntly dissected off with gauze dissection, when the apparently normal looking, though atrophic and contracted, colon was found beneath. In this case the entire ascending colon was excised with the hepatic flexure and the ileum was anastomized with the transverse colon.

The other case in which the membrane was not removed was in a patient operated upon primarily for cyst of the broad ligament, which we deemed enough surgery for one frail woman.

The results of these operations may be epitomized as follows:

The first case, whose detailed history will be found above (Case 1) was operated upon May 8, 1908, and at the present time is entirely well, weighing 102 pounds, six pounds more than she ever did. She has since married and attends to all her household duties.

The second case (Case 2) a patient of one of my surgical friends, Dr. George B. Norberg, upon which I made a diagnosis and suggested the surgical procedure above outlined, was operated upon by Dr. Norberg on May 18,

1908. This patient reported to Dr. Norberg Nov. 25, 1908, as entirely cured.

The third case (Case 3) was operated upon on Oct. 12, 1908. When I last heard from her directly (about Feb. 1, 1909,) she was considerably improved but still suffered some pain and was yet rather constipated. May 8, 1909, I saw her physician, Dr. Davies of Emporia, Kansas, who reported that he had discovered some suspicious symptoms of specific disease and had had her for several months upon the iodides, and that she has since improved greatly and is apparently practically well.

The fourth case (Case 4) was operated upon in November, 1908. Her recovery was rendered uncertain from the fact that less than two weeks after leaving the hospital her child was taken sick. I last saw her in March, 1909, when she expressed herself as finally, with some rest and care of herself, improving rapidly and practically well.

The fifth case was the one with the definite appendicular trouble and she seemed immediately relieved, but I have not heard from her since leaving the hospital. The sixth and seventh cases were early cases but have been entirely cured.

The eighth case, while not properly belonging to the experimental operation suggested, was the case in which the ascending colon was excised. This case has also been entirely cured.

In summary of the operation we would remark that our report is intended as an observation and not as an argument. The results thus far have been extremely gratifying and encouraging. Whether these results remain permanent is yet to be seen, as the lapse of one year or less is not sufficient to prove the merit of a procedure. Such as they are, however, they seem to us to warrant a trial as the operation is comparatively simple and relatively safe and offers some definite hope of cure of a disease otherwise incurable except through a still more radical procedure.

Before concluding we would like to refer the reader to an article by Arbuthnot Lane of London, on the subject "The Surgical Treatment of Chronic Constipation (Surgery, Gynecology and Obstetrics, February, 1908). We are of the opinion that in this paper Mr. Lane is dealing with much the same condition which we have presented here. He presents the symptoms of constipation as the eminent characteristic of his article. In our experience, while constipation is always present, it is not the symptom which has brought the patient to the surgeon. Instead the abdominal pain, flatulency, and distress which have usually led to the diagnosis either of chronic appendicitis or gall-stones, have called for surgical relief. Also Mr. Lane gives no description of the characteristic membrane which we have presented herein, but speaks simply of "adhesions" as found at various points of the colonic circuit. These adhesions he seems to find equally as prevalent about the transverse and descending colon, and the sigmoid. This we have not been able to verify in any of our cases, though we have as a routine searched for them. We have also been able to find our pericolonic membrane in the course of three autopsies on patients dying of other causes. In no case, however, thus far have we been able to find evidence of any such condition elsewhere than in the ascending colon and the adjacent portion of the transverse colon. The description, however, which Mr. Lane gives of the mechanics of his cases is classic. He recommends as treatment the excision of the entire colon followed by an ileo-sigmoidostomy, and reports excellent results. This treatment is rather too radical to receive general acceptance. Yet we are ready to admit that in some instances it may prove advisable. If by the long continued interference with peristalsis the muscular walls of the colon should have so far atrophied as to be unable to regain their tone after the mechanical restraint of the pericolonic membrane is removed, such a procedure is the only one left. In fact, as stated above, in one of our cases we did deem it advisable to excise the contracted and atrophic ascending colon. With an earlier diagnosis, however, and the free removal of the restricting membrane as we have suggested, we believe such radical measures may prove unnecessary. It is well to remember, however, that after our suggested procedure, measures to revive the sluggish peristalsis are important. Regular habits, anti-fermentative diet, occasional catharsis, and above all abdominal gymnastics and massage are important after considerations.

A CASE IN WHICH BOTH PATELLÆ WERE SUTURED ON THE SAME DAY FOR DOUBLE FRACTURE

With the Notes of a Displacement Which is Against Bony Union

By RUTHERFORD MORISON, F. R. C. S.
Lecturer on Surgery, Durham University College of Medicine; Senior Surgeon, Royal Victoria Infirmary, Newcastle-upon-Tyne

WIRING the patella is now so common an event in surgery as to attract no attention. I have sutured the single fractured patella many times, but only on one occasion have I had to treat a fracture of both. It is probable, therefore, that the latter is a comparatively rare accident.

A recent visit from the patient whose accident has been referred to, and more than eight years after, has enabled me to obtain the accompanying photographs, which show how complete his recovery has been, and furthermore has suggested to me that I should publish the case and offer some observations I have made in connection with it.

The patient, a dentist, age 31, was hurrying down stairs on January 8, 1901, when he fell quite suddenly on his face. On attempting to get up he again fell down. A friend who was present says that the patient was descending five steps and thought there was only one, with the result that he fell down the remaining four.

On admission to a private hospital he was found to be an extremely stout "cobby" man, with a transverse fracture of both patellæ, and at least one inch of separation between each fragment.

Operation, January 18, 1901.

The fracture, first on one side, and then on the other, was exposed by the reflection of a semilunar flap with the convexity downwards (Figs. 1 and 2). Each patella was found to be fractured straight across, as if divided with a knife. On either side there was a fringe of torn aponeurosis half an inch broad, hanging down from the edge and over the broken face of the upper fragment. The tear in the aponuerosis extended for half an inch on each side from the fracture. The joint contained a considerable quantity of blood stained synovial fluid.

The aponeurotic curtain was separated from the face of the upper fragment but was carefully preserved, then the broken bones were restored (see Fig. 3) with chromic catgut, and finally the aponeurosis was carefully sutured with interrupted sutures of chromic catgut, repairing the whole tear. The skin wound was entirely closed by catgut sutures, without drainage. An abundant antiseptic wool dressing was applied over gauze wrung out of spirit corrosive solution, 1 to 1,000, which was applied directly to the wound. The limbs were each secured firmly on two lateral Gooch splints, reaching from the perineum to the sole of the foot internally, and externally from the trochanter major to the same level as that reached by the internal splint.

On February 1, 1901 (13 days after operation), the wounds were dressed for the first time, and were found to be healed. Three days later the patient went home.

During the first six weeks after the operation he wore the splints continuously, except when the dressing was done. Thirteen weeks after the operation he was able to flex his knees slightly. Two weeks later he could bend them to a right angle and could ride a bicycle perfectly well. Since then his progress has been uneventful. He has never had any pain or stiffness in his knees (Fig. 4), and is accustomed to stand for the whole day at his dental chair. On several occasions he has walked as far as twenty miles in a day, and says that his legs are in every respect as good as ever they were.

The first point I wish to draw attention to is that of the use of antiseptics in such operations. The ideal asepsis has not yet been realized, so far it has been impossible of attainment, and serious accidents have I know occurred in the hands of the best surgeons after operations upon the knee joint. In contrast I know of none attributable to the strict followers of Lord Lister's technique, and I believe that these operations are entirely safe if this method is efficiently carried out.

The next point is in reference to the use of absorbable sutures instead of silver wire. I have always regarded the use of unabsorbable ligatures or sutures in t e tissues as a violation of surgical principles, and have avoided them if possible. It is possible in the variety of fracture under consideration, for my cases have shown that the suture method — as adopted in the instance described — has been followed by uniform success.

Fig. 1.

Fig. 2.

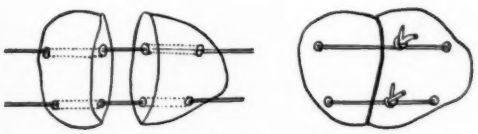


Fig. 3.

Finally as to early movement: there are doubtless advantages in this, but there are drawbacks. Wiring permits of early exercise, but not always with impunity (see Fig. 5). With the patella sutured with catgut it would not be safe to allow movement of the knee in less than from four to six weeks. After the splints had been removed my practice has been to tell the patient to give the knee any exercise he likes, short of causing pain in it, but not to try to hurry recovery. The result has been without exception that in a few weeks the joint was as useful as before, and failure to obtain bony union has never been observed. I have never seen permanent stiffness of the joint after this operation in any of my cases, though some of the patients were over 60 years of age.

I wish to draw attention to the displacement of the lower fragment of bone. It is so well illustrated by the accompanying skiagrams (Figs. 6, 7, 8, 9, 10, 11) as to require no description. Obviously the position of the lower fragment, with its broken surface tilted for-

Fig. 4.

Fig. 5.

Fig. 7.

Fig. 6.

Fig. 8.

Fig. 9.

Fig. 11.

Fig. 10.

Fig. 13. Right leg of patient whose case is described, eight years after operation.

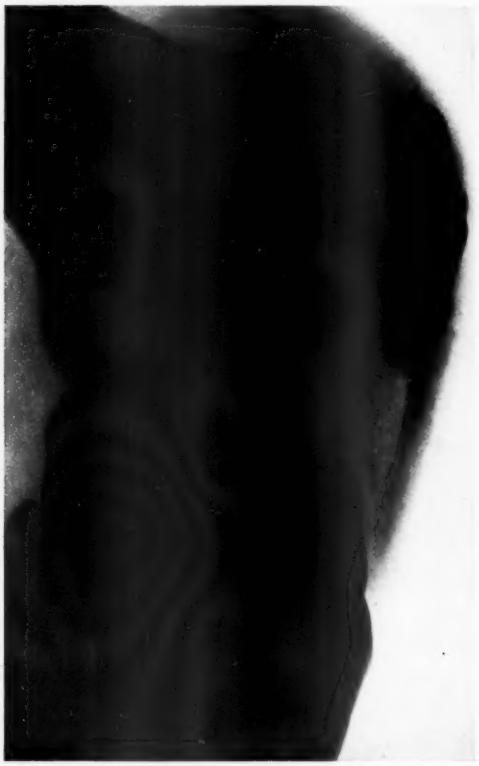


Fig. 12. Left leg of patient whose case is described, eight years after operation.

ward and its cartilaginous deep surface opposed to the broken surface of the upper fragment, is a bar to bony union as complete as the aponeurotic curtain. It cannot have escaped observation, though I have seen no note of it.

In these cases I have always found during operation, as would be expected, that the transverse tear in the aponeurosis was considerable. It appears to me — and this point seems to have been neglected — to be as necessary to repair this as to bring the bony surfaces into apposition.

DIRECT BLOOD TRANSFUSION BY MEANS OF PARAFFIN COATED GLASS TUBES

By GEORGE EMERSON BREWER, M. D. and NOEL B. LEGGETT, M. D., New York City
(From the Surgical Research Laboratory of the College of Physicians and Surgeons.)

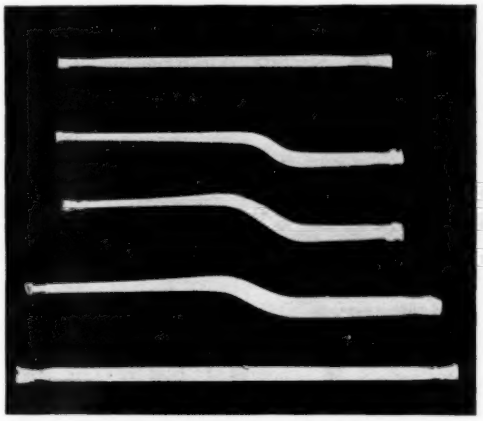
THE object of this communication is to record the results of some experiments undertaken with a view to finding some simple method of direct blood transfusion.

End to end suture as practiced by Carrel, and union by the ingenious cannula of Crile, have been the methods generally employed in the past. They present, however, so many technical difficulties, that considerable laboratory experience is necessary before one can feel at all sure of carrying out a successful transfusion by these methods.

During the summer of 1908, a series of experiments were undertaken by Dr. Brewer, at the Surgical Research Laboratory of the College of Physicians and Surgeons, by the employment of paraffin coated glass tubes, to effect union between the artery of the donor and the vein of the donee. A set of glass tubes was made as shown in Fig. 1, some of which were straight with a uniform caliber, others bayonet-shaped, and still others somewhat tapering in shape and caliber, to be used when transfusion was attempted from a large adult artery to the small vein of a child. Each extremity of the tube is notched to allow a ligature being applied after the tube is introduced into the lumen of the vessel. These tubes should be sterilized in a steam autoclave or by boiling, and afterwards dropping in boiling paraffin, and the excess of melted paraffin removed by shaking the tube in the air. This also results in rapid drying of the paraffin, leaving a thin film on both the inner and outer surfaces of the tube. The paraffin adherent to the outer surface of the tube then is removed to allow more ease in handling.

The following experiments were undertaken:

Experiment No. 1. Two moderate sized mongrel dogs were etherized. The external jugular was exposed in dog No. 1, and the common carotid in dog No. 2. The proximal extremity of the external jugular of dog No. 1 was temporarily clamped and the vein divided, allowing copious hæmorrhage from the distal extremity. When the animal began to show signs of weakness and failing pulse, the distal extremity of the vein was ligated. The two dogs were then placed side by side, the carotid artery of dog No. 2 double clamped and divided between the two constricted areas. The lumen of the proximal portion of the artery was then expanded by means of three mosquito forceps, and one extremity of the glass tube introduced and held by a silk ligature placed around the vessel in the notch of the tube. The orifice of the proximal portion of the jugular vein was next expanded in the same manner by means of three mosquito forceps. Before introducing the distal end of the glass tube, the arterial clamp was temporarily released, and a few jets of bright arterial blood allowed to pass from the tube. It was then quickly introduced into the lumen of the vein and secured by a second silk ligature. As soon as the temporary clamps were removed, blood could be seen to pass from the artery of the donor to the vein of the donee, causing distinct pulsations in the vein, corresponding with the arterial pulse of the doner. Dog No. 1 was quickly revived by the transfusion, which lasted about six minutes. The vessels were then ligated and the wounds closed and dressed. Both dogs remained well.



Paraffin-coated glass transfusion tubes.

Experiment No. 2. Two moderate sized dogs were etherized. The vessels exposed as in the previous experiment. Dog No. 1 was bled until the pulse was no longer perceptible and the respirations irregular. He was then transfused from dog No. 2 in the same manner as in the previous experiment. When suffi-

cient blood had been allowed to pass to restore dog No. 1, it was found that dog No. 2 had become almost exsanguinated, and showed signs of fatal collapse. The carotid artery of dog No. 1 was hastily exposed, also the external jugular of dog No. 2 and transfusion carried out from dog No. 1 to dog No. 2 until dog No. 2 was thoroughly revived. The experiment was then discontinued, the vessels ligated and the wounds closed and dressed in the usual manner. Neither dog showed any untoward symptoms, other than slight weakness and anæmia.

Four other experiments were made with dogs, the technique being the same in each instance, and corresponding with that described in experiment No. 1 in which a successful transfusion was accomplished. In no instance was there clotting in the tube, and in no case did the animals show any signs of ill health.

Several months later a series of experiments was undertaken by Dr. Leggett, also at the Surgical Research Laboratory of the College of Physicians and Surgeons, with a view to confirming the results obtained in the six original experiments, and to determine if possible how small a tube could be successfully employed, and approximately the rate at which it was safe to allow blood to flow from one animal to another.

Twenty-five operations were performed with tubes varying in length from one to three inches, and in diameter from $\frac{1}{20}$ to $\frac{1}{8}$ of an inch.

The following is a record of Dr. Leggett's experiments:

Experiment No. 7. Small dog etherized, the external jugular opened and blood allowed to flow until the animal was almost exsanguinated. The vein was connected with artery of a larger dog and blood allowed to flow through tube slowly until the pulse had regained its normal force, fullness, and rhythm. Blood flowed about twelve minutes. No clotting. Both dogs recovered.

Experiment No. 8. Small dog bled till pulse was almost imperceptible, when blood from a larger dog was passed into jugular vein through a paraffined tube until pulse and respiration became normal. Both dogs recovered.

Experiment No. 9. Medium sized dog, vein opened and connected by larger tube with carotid of donor and blood allowed to flow at full pressure. Dog died in about ninety seconds, was immediately autopsied and death found to be due to paralysis of the heart from over distention of right side.

Experiment No. 10. Blood passed from dog (laboratory No. 47) to dog (laboratory No. 191) and allowed to flow through small tube eight minutes. Both dogs recovered.

Experiment No. 11. Double transfusion. Dog (laboratory No. 204) and dog (laboratory No. 205) had the external jugular veins and carotid arteries connected and blood allowed to flow till stoppage occurred, which in one tube was in eight minutes, and in the other ten. The tubes used were extremely small, and the current was slow. Both dogs recovered.

Experiment No. 12. Transfusion as in No. 11. Both streams stopped after ten minutes. Both dogs recovered.

Experiment No. 13. Blood from dog 212 allowed to flow into jugular of 211 until clot formed in vein. It was subsequently found that the clot was due to a small area at the end of the tube having been denuded of paraffin while inserting, and this area acted as a foreign body. Both dogs recovered.

Experiment No. 14. Transfused blood from 235 allowed to pass for fifteen minutes to 238. Dog 235 still living. Dog 238 died of peritonitis following subsequent abdominal operation.

Experiment No. 15. Blood allowed to flow five minutes when it was stopped to save donor. Donee died one month later from other causes.

Experiment No. 16. Blood from carotid of 241 to jugular of 240 flowed thirteen minutes; no clotting. Both dogs recovered.

Experiment No. 17. Transfusion from carotid to jugular. Donee died from over distention of right heart.

Experiment No. 18. Transfusion from 248 into 247. Blood flowed rapidly for five minutes and was then stopped to save donor.

Experiment No. 19. Blood from 250 transfused to 89 to save its life during operation. Flow continued for six minutes until dog revived.

Experiment No. 20. Transfusion from artery to vein in same dog. Blood allowed to flow for ten minutes at a low pressure. Dog recovered.

Experiment No. 21. Blood of 259 transfused into vein of 260 and allowed to run for ten minutes. Both dogs recovered.

Experiment No. 22. Blood of 262 allowed to flow through large tube into jugular of 263. Dog 263 died two minutes after flow started from over distention of right heart. No clotting.

Experiment No. 23. Blood flowed for eight minutes and then stopped to save donor which was a small dog.

Experiment No. 24. Blood transfused and allowed to flow ten minutes. Both dogs recovered.

Experiment No. 25. Transfusion from 6 into 7. Blood did not flow owing to clamp placed on artery before cutting being so strong that it crushed the intima. Artery was cut off below point of injury, the tube reinserted and blood flowed ten minutes until the vessels were ligated.

Experiment No. 26. Carotid artery of 21 was severed and a cannula inserted, re-establishing the circulation. Blood flowed for ten minutes, when soft clamps were put on the artery and it was sutured. Dog still living, five weeks.

Experiment No. 27. Cannula placed in carotid artery of 28 as in previous experiment, and blood flowed

through it without clotting or reducing the pressure distal to the cannula.

Experiment No. 28. Transfusion from 23 to 26 lasting six minutes. No clotting. Both dogs recovered.

Experiment No. 29. Transfusion for ten minutes as in last experiment. Both dogs living.

Experiment No. 30. Transfusion from artery into vein of the same dog. Blood flowed twenty minutes. Recovered.

Experiment No. 31. Cannula placed in carotid of dog and allowed to flow 15 minutes and then the wound was sutured over the cannula. Opened next day but ligature on distal end was too tight and artery sloughed. Dog still living.

The method was subsequently demonstrated by Drs. Brewer and Leggett, at a meeting of the Alumni Association of the College of Physicians and Surgeons on the evening of May 25, 1909, at the college building.

It will thus be seen that of thirty-one experiments, only three animals died, each from a too rapid transfusion of the blood, causing over distention of the right heart. This accident occurred when the largest tubes were used through which the flow was very rapid.

In some of the later experiments this accident was avoided by gently compressing the arterial trunk with the finger, reducing thereby to a considerable extent the rate of the flow.

On one occasion only did the blood apparently clot in the tube, and that was undoubtedly due to the very small caliber of the tube used. In one other experiment clotting occurred in the vein near the extremity of the tube, due to an accidental separation of the paraffin coating.

In one other case the blood did not at first flow through the tube, but the arrest of the circulation was found to be due to a clot in the artery from a wound of the intima due to a too vigorous application of the preliminary clamp. When the injured part of the artery was cut away, blood flowed through the tube as in the other experiments.

The writers believe that this method is the simplest yet proposed, that it can be carried out by any surgeon of ordinary experience without the necessity of previous training. They also believe that considerable time may be saved by its employment, in that it requires a shorter exposure of the vessels than is necessary to effect union when the methods by direct contact are employed.

The method has been employed to effect transfusion in a patient at the Roosevelt Hospital, who was suffering from acute anæmia due to repeated profuse gastric hæmorrhage.

In this instance blood flowed for nineteen minutes through a medium sized tube without clotting. The patient rallied well. His hæmoglobin rose from 30 to 70 per cent during the progress of the operation, but he died the following day from a recurrence of the hæmatemesis.

REMARKS ON THE TREATMENT OF INOPERABLE CARCINOMA OF THE UTERUS[1]

By GEHEIMRATH AUGUST MARTIN Berlin

IT gives me extreme pleasure to have the honor of addressing this combined meeting of the Chicago Medical and Gynecological Societies. For more than twenty years I have been a Fellow of the Chicago Gynecological Society; have ever since been desirous of meeting with it in order to express in person my high appreciation and thanks for the honor thereby conferred upon me.

It is moreover a distinct pleasure to address such a large number of the Chicago profession, reviewing a question that is so much discussed and of such great interest to both the gynecologist and the practitioner. We are all interested in the question of cancer. In spite of all research and surgical skill with which it has been combated for many years, our results are far from gratifying. We must confess that cancer appears to be more prevalent in our days than formerly. We all feel, I dare

[1] Read before the Joint Meeting of the Chicago Medical and Gynecological Societies, May 13, 1908.

say, that there is little hope of great success as long as we do not know its origin. In spite of the myriads of most careful investigations we are bound to confess that none of the theories proposed to account for cancer are satisfying or give a true aspect of the question.

All agree that uterine cancer is ultimately fatal. We know that some rare cases have been reported in which the disease was thought to have been spontaneously healed.

Lomer of Hamburg has collected a few instances of such spontaneous healing, but it appears to me that they can be subjected to criticism. Thus, once I observed a scirrhous growth ascertained by microscopic examination for more than twenty years during which time the patient was not operated: after this term I lost sight of the case. If the disease may last for twenty years without marked extension, some might call it healed! However, these are extremely rare instances and they do not furnish a reason for declining surgical interference when it offers any chance of cure. We as gynecologists advise operation, yet we know that — although it may appear successful for weeks, months, or years—the disease will finally recur unless it has been completely removed. Back of all discussion is the question "Can we remove all of the growth?" Undoubtedly we can in some instances. But how can we judge whether we have completely eradicated the disease?

Twenty years ago we believed that we must remove the connective tissue in the pelvis in order to absolutely cure the patient. At that time we considered that the growth first spread to this part of the pelvic tissue and then progressed to involve the lymphatics and the glands. At that time, I remember very well, it was stated that if the inguinal glands were not infected the case could be cured if all the growth in the pelvis was removed. Yet we now know that the lymphatics of the cervix do not stand in immediate connection with the inguinal glands. The lymphatics of the external parts drain into the inguinal region, but those of the inner genitalia run along the ureters and the larger vessels, so that involvement of the inguinal glands is no test whatsoever as to the possibility of complete removal. For more than ten years Emil Ries, Wertheim, v. Rosthorn and others have advised us to remove the pelvic glands that lie along the ureters and the large vessels on the side of the vertebral column. We took them out, as it is not very difficult to do so, but in studying the microscopic sections we found that many glands were not cancerous even though they were enlarged. Indeed, we know very well that in all cancerous growths there are septic organisms which infect glands and enlarge them considerably without bringing cancerous material to them. So if there are enlarged glands behind the peritoneum we can not definitely say before examining them microscopically whether the disease has extended to them. Schauta has taken the lead in declining to remove the pelvic glands, saying that if they are involved the patient is lost. Yet if we accept this view I am afraid we will differ from our surgical brethren who do not term an operation for cancer of the breast as radical unless all glands adjacent to the infected part are removed. But it is not my intention to discuss these questions to-night. The subject of my remarks is the treatment of the inoperable cases.

Only too frequently we meet in general practice as well as in gynecological work, cases in which the disease has spread so far that it cannot be completely removed by surgical measures. Yet these cases require attention. You know in your own work that it is not an agreeable task to treat them; not infrequently medical men decline to care for such cases and send them away to seek cure where they can. Czerny is right in insisting that this is not the way a medical man should act. I think it is our duty to help these patients as best we may, to try to relieve their suffering, and do the best we can to give them a chance of living under tolerable conditions. In these cases *general treatment* is indicated as a first measure. We must try to improve their general condition in every way and to give them the best and most careful nursing. I will not go into details of treatment, but will say that we no longer believe as we did some years previously, that alcohol is a means of strengthening these forlorn cases. We now know that alcohol does not benefit in the way we used to think it did, and while we should never decline to give it when it is indicated, we should remem-

ber that it is a stimulant of only short duration, and should be given cautiously. In the care of these cases, all the acceptable physical and mechanical methods which are known to the medical profession should be employed, as frequently some of these will give great benefit. One of the great difficulties is encountered toward the end of the disease in the indigestion which makes proper feeding a difficult matter. We may th n give solutions of salt by the subcutaneous method, and particularly sugar, as advised by Prof. Friedrich in solutions of one-sixteenth per cent of grape sugar as well as other sugars, which may preserve the strength of the sinking patient.

Our attention, however, must particularly be directed to the local condition. Most of these cases in the later stages of the disease suffer severely from bleeding, sloughing, and pain. Occasionally, and particularly in aged ladies these symptoms may be absent. Thus, in one patient of seventy-three I met with but a small amount of bloody discharge without pain. Other similar cases have come under my observation where the family insisted upon an examination of the mother, who could not be convinced there was any necessity for examination because of the lack of marked symptoms. When the case presents no special complaint but merely induration without bleeding on examination and but a small ulcer, I have advised only general treatment, as I know that many such cases have gone on for months and years before fatal termination. Thus it appears that such patients best be left alone. In the far larger majority bleeding and sloughing and pain demands our help. This, — I think all gynecologists will agree — must consist in the removal of the cancerous outgrowths and the destruction of all the zone of infiltration which surrounds the craterous ulcer. For may years any form of escharotic has been advised for application to this infiltration zone. We have used the actual cautery, the electrocautery, and so on, but they have given unsatisfactory results. Not rarely have they caused severe bleeding which was difficult to control. Therefore it has been our rule to carry further on such treatment with some potential cautery. Arsenic has given good results as well as perchloride of iron which has a good effect not only as a hæmostatic but as an escharotic, producing good granulations after the slough has been thrown off. Recently Gellhorn of St. Louis has employed acetone, which has been applied in a simple way. After the growth has been carefully curetted the acetone has been applied through the speculum on cotton wool to the crater which has been made. After some days the cotton is removed, and when the slough falls out the granulations look healthy and healing occurs in many instances in a relatively short time. Of course the parts are protected from injury while the acetone is retained. This seems to be a very beneficial method; only rare instances do not respond to this form of treatment. In these the carcinomatous growth rapidly returns together with the old complaints of bleeding, sloughing, and pain. Such cases in my experience are generally approaching the end. Yet fortunately these are the exception, as in most cases the results are rather gratifying. Formerly we believed that it was wise to apply such local treatment infrequently and to let these cases heal by granulation. But later we have taken the view that it is better to repeat the local applications in order to cause reiterating fresh granulations and cicatrization. Thus we have advised local applications every month or two; Gellhorn believes that it should be done every month. Some weeks ago in St. Louis Gellhorn showed me some cases which although the disease was far advanced, did well as soon as bleeding and sloughing was controlled. Pain and sloughing ceases and the general condition improves rapidly. Especially the fearful pain does disappear under such treatment, even when it can not be controlled with morphine or other narcotics.

These local treatments have proven of great benefit; it appears to me that we should treat them at frequent intervals in order to produce fresh granulation. Many patients progress so satisfactorily that after months or years the husband or the children say: "Mother is getting on so well that we think you were deceived as to the character of the disease." Regularly very soon thereafter the cancer recurred.

We have been much interested in determining how long we can prolong the life of the

patient. In my Greifswald clinic our patients lived on an average nearly 300 days; only a small proportion much longer. The corresponding results in other clinics show similar data. So it would appear that we are not only able to relieve bleeding, sloughing, and pain, but to prolong life to some degree and make it fairly endurable. These results must be considered rather satisfactory when we recall that all patients subjected to this method of treatment were regarded as inoperable and doomed at the time of our first examination.

There are two other points upon which I should like to say a few words. I refer to cases in which radical operation had been attempted and the uterus, parametrium, and glands removed by operation. In the majority of these the disease recurs for we can hope to cure not much more than 25 per cent of cases. What should we do when we discover recurrence? V. Rosthorn believes that we should return to then surgical methods and he again opens up the incision and removes the glandular involvement. In his experience this is an effectual procedure. Yet the difficulty is that patients as a rule will not return for observation, and commonly come too late for such treatment. For a long time I have operated the recurrences, but as the patients were not under my personal control they frequently would not come back early enough. As long as they felt well they returned for examination, but after three or four years, when the pain again set in it was called rheumatism, or a consequence of indigestion, or perhaps they called a medical man who had no knowledge of the case and were treated merely for their symptoms, and only when the treatment proved unsuccessful they return to the surgeon too late for operative interference.

The other question is, what should we do in case of pregnancy in a cancerous uterus. Unfortunately this not rare. We often find pregnant women complaining of bleeding after sexual intercourse, especially in early cancer of the cervix. There are also cases of extensive disease in which the whole cervix has sloughed, leaving in its place a large ulcer above which is a small corpus. In such cases a slight contact is sufficient to excite hæmorrhage, nor are such cases free from the chance of impregnation. Pregnancy is a most fearful complication of early cervical carcinoma, for the parts physiologically become hypertrophied, hyperæmia sets in and the lymphatics are early infected. In most of the cases of two or three months' pregnancy associated with a small cancer of the cervix a radical operation should be performed with removal of the glands, which unfortunately are almost always infected. What shall we do with the cases near to term in which the cervix is enlarged and carcinomatous? It has been said that labor should be early induced because the child may be infected with cancer. But of this we have no positive knowledge. We know how cancer invades the tissue, but what is cancer! It is not the child which should be taken care of, but the mother. When the case is not suitable for radical operation we should be guided by the symptoms, and if the cancer causes bleeding, sloughing, and pain we should locally remove the growth, scrape out the granulations and burn the ulcer with perchloride of iron, acetone, or anything else. Sometimes the induration of the pelvic tissue is so great that it seems almost impossible to effect delivery through the cancerous cervix. If you can, remove the infiltrated part, but even if the prognosis is extremely bad it is not wise to bring down the fœtal head upon the cancerous tissues. In such cases there is, I believe, good indication for Cæsarean section.

These are the points which I wish to bring for your consideration. Let me hope that they meet with your approval, as I feel convinced that these inoperable patients can be greatly relieved by this method of treatment.

LATE MANIFESTATIONS OF INTRACRANIAL HÆMORRHAGE OF TRAUMATIC ORIGIN[1]

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IN the Surgical Observer of 1816 (page 446, also Guy's Hospital Reports, 1886, page 157), Sir Charles Bell records the following observation: "Strike the skull of the subject with a heavy mallet. On dissection you will find the dura mater to be shaken from the skull at the point struck; repeat the experiment on another subject and inject the head minutely with size injection and you will find a clot of the injection lying betwixt the skull and the dura mater at the part struck and having an exact resemblance to the coagulum found after violent blows on the head. I imagine this is conclusive."

Tillaux, whose lectures I attended twenty-seven years ago, in his Anatomie Topagraphic calls attention in this connection to the fact that the adhesions of the dura to the skull are the least in the temporal fossa at the site of the distribution of the meningeal artery. It has also been shown that the dura is more adherent in youth and advanced age than in middle life.

To go still further back, Mr. J. Hill in 1751 (Cases in Surgery, Edinb., 1772, also Guy's Hospital Reports, 1886, page 187) reports the case of a man about thirty years of age struck on one side of the head with a loaded whip, and on the other side with a crab stick. The next morning he was lethargic and the whole right side was paralytic. There was no fracture or depression. Symptoms showed the necessity of opening both sides of the skull, but the impressions of the staff being strongest on the right side it was opened first, though the symptoms equally indicated the contrary. A large extradural clot was removed. The operation gave relief, but the friends would not permit operation upon the opposite side until four days later, when the case seemed hopeless. Then the other side was opened, and a very large extradural clot was removed. The patient was in good health in 1791, that is, twenty years later.

It is interesting after reading such observations to note the two cases which follow, recorded by Mr. C. Cock in Guy's Hospital Report, 1842. (Vol. vii, page 175.)

A patient fell, injuring the left side of his head. He was brought to the hospital at 7 P. M. in a conscious condition. At 4 A. M. patient got out of bed "for motions" but answered incoherently. At 8 A. M. patient was found entirely unconscious, with stertorous and interrupted breathing. At noon he was trephined and a large clot of blood was removed. Patient recovered and remained well until 1849, a period of eight years, after which epilepsy developed, the patient dying in 1856 from a hæmorrhage at the site of the old injury. At this time he was under the care of Sir Wm. Gull.

A year later the same surgeon, Mr. Cock (idem, page 180), reports a case having similar symptoms. He cut down upon the skull at the point of contusion, and finding no fracture thought best not to trephine. The patient died a few hours later and at the post-mortem a large extradural clot was found.

It seems strange that the success of the first case should not have suggested to Mr. Cock the necessity for trephining in a second case having similar symptoms. It seems stranger still that so many years elapsed before the profession at large came to understand the full significance of traumatic cerebral hæmorrhage, both extradural and intradural or epi- or supradural and subdural, according to the nomenclature one may elect.

To be sure occasional observations were made of epidural and subdural clots, some caused by blows or falls and some by bullets, such as one recorded by Guthrie in the Peninsular Campaign (Injuries of the Head Affecting the Brain).

The number of cases was, however, small, if we may judge by those which are reported

[1] Read before the Chicago Surgical Society, May 5, 1909.
[2] For the history of cases I am indebted to my assistant, Dr. Isadore Fuhs.

and advance in knowledge seems to have resulted, in a considerable degree at least, from observations made at post-mortems.

Excellent papers upon the subject have been written by various authors, whose names I need not here record, since many of them are cited in my paper in connection with cases which they have recorded, but most of these papers have been published within relatively recent years.

Notwithstanding all that has been written, the number of recorded operations is small, and to find the special class of cases which I shall place before you to-night a careful search has been made through the literature of the Surgeon-General's library at Washington. I am surprised that so few cases have been found. Doubtless some may have been overlooked.

The experience which first especially attracted my attention to this subject was an operation performed in 1896, and reported in the Philadelphia Medical Journal, Sept. 16, 1899. It was as follows:

CASE 1. J. G. Male. Age 56 years. By occupation a farmer. On May 9, 1896, the patient was kicked by a horse on the right side of the head nearly over the coronal suture. The scalp was cut through and patient was rendered unconscious for a short time, possibly half an hour or an hour at the longest. He recovered and without assistance walked from his barn to his house. The wound was dressed and healed promptly. For two days the patient complained of faintness. About June 17th, he began to complain of headaches, not very severe, but persistent. He had always been free from any trouble of this kind and was an unusually healthy man. From this date the headache continued until the time of operation. It was never very severe, and the patient was unable to localize it. On June 20th, the patient seemed to become dazed and lapsed into a state of indifference, being very quiet and listless, a condition utterly foreign to him. He complained of increasing lack of strength in his right arm and leg, which eventually amounted to partial paralysis. His ability to think and reason became less each day. His bowels were obstinately constipated, he had no appetite, and when undisturbed he manifested a tendency to sleep.

I saw the patient on June 26th, with Dr. F. W. Upson of Connecticut. On examination I found that his eyes responded normally to light, that motion was perfect, and that vision was seemingly intact. There was no difference in the pupils. The right arm lay apparently helpless, but when I insisted very strongly, he would, with great effort and deliberation, raise it from the bed. The patient would grasp the hand with considerable firmness. He could move the right leg more freely than the right arm, but still only slowly and with considerable embarrassment. Sensation seemed normal in both right arm and leg. The knee reflex was normal. The left arm and leg were moved promptly. Patient seemed somewhat slow in comprehending what was said to him, but answered accurately all questions. There was a scar about 2½ inches long extending from the frontal region upward and backward at about 1½ inches to the right of the sagittal suture, and parallel to it. This marked the point at which the man had been kicked. A curved flap was made with its convexity forward, the flap having a length of from 2½ to 3 inches. Upon lifting the flap no injury could be found to the skull at this point. The skull was penetrated by a trephine, but the dura mater was found to be normal. The brain bulged strongly into the trephine opening. No pulsation could be felt. An aspirating needle inserted in all directions found nothing. A probe carried in all directions under the skull and outside the dura mater disclosed no roughness. It was, therefore, decided to trephine on the opposite side of the skull in the region of the arm center. I trephined upon the right side first, because the external injury had been at this point. The difficulty in moving the right leg, and more especially the right arm, indicated an operation upon the left side of the cranium. The scar upon the right side, however, was so distinct and the injury had been so severe that it did not seem warrantable to disregard it. Thus, the first opening was made contrary to the direct indications of the case as derived from localization symptoms.

Upon laying bare the skull by the same method as had previously been done upon the right side, a blue point could be seen, as of venous blood, shimmering through the external table. There was, however, no fracture. The pin of the trephine was inserted at this point and there was profuse hæmorrhage of venous blood. Upon division of the skull this bleeding largely ceased. The dura mater was seen to be somewhat thickened and more dense than normal. Upon division of the dura there was an escape of a large amount of liquefied blood of dark color. After this, many clots were evacuated. The whole amount evacuated must have been from four to six ounces. The brain was pushed away from the skull sufficiently to accommodate the accumulation of blood, and the removal of the latter left a considerable cavity in the parietal region. The cavity was thoroughly drained by turning the patient upon his side and wiping it out with a sponge. The pia mater seemed to be intact. The cavity was drained with a short piece of rubber tubing, and a small amount of iodoform gauze was inserted. Both wounds were dressed with iodoform gauze and a bandage was applied. The patient's condition at the close of the operation was good. After the operation the patient slept almost continuously for thirty-six hours. The wound discharged a large amount of serum, but healed by first intention, except at the point of drainage. The attending physician reported that reaction after the operation came on slowly. For some time after

the operation the patient was unable to articulate distinctly, and swallowed with difficulty, but his mind was perfectly clear. The partial paralysis of the right side was entirely relieved and the patient used his limbs freely. Very large quantities of serum escaped from the wound, estimated by his physician as "One quart in twenty-four hours." The patient's health was restored to normal and he remained well for about nine years. After this the patient complained of headache, lost flesh, grew gradually weaker and his memory gradually failed and he died in January, 1908, nearly twelve years after his injury.

CASE 2. It was not until recently that I saw a similar case to the one just recorded. In January last (1909) my friend, Dr. Ashmun, telephoned that he had a patient who about two months previously had had a fall, and that recently he had presented symptoms referable to that injury. Recalling my previous experience I replied that I suspected subdural hæmorrhage, and advised that the patient be sent to the hospital at once. The case was complicated by the fact that the patient was in delicate health and all his urine had for several years been withdrawn with a catheter. The patient was sent to the hospital at once, where the following history was obtained:

On Nov. 11, 1908, in descending from a street car the patient fell striking on the left side of the head. This caused some abrasion over the outer portion of the left frontal bone. The injury was apparently slight. He was picked up by a passing auto in a dazed condition. He was able to stand but could not talk, although when asked his name he was able to spell it out, but could not pronounce it. He asked, however, to whom he was indebted for the kindness in picking him up. It was a short time before he could tell where he lived. On reaching home, one hour after the injury, the left eye was closed on account of swelling and ecchymosis and he vomited considerable blood. This was due to a cut in the mouth. There was no bleeding from the ears. There was slight ecchymosis of blood at the outer canthus of the left eye behind the conjunctiva. No defect of hearing. By 9 o'clock he was conscious, although perhaps slightly dazed. At this time the patient could move both arms and both legs. Speech was difficult. He remained in bed for about one week and did not leave the house for about five weeks. Activity was limited by the fact that in the right eye he had a cataract and the left eye was closed by swelling. During this period he was entirely clear mentally. After five weeks the patient walked a considerable distance to the physician's office and later took a street car and went down town to have his glasses refitted. He remained in apparently normal condition, although being perhaps somewhat depressed mentally, until January 7th.

On Jan. 8th, while walking across the room, the patient's wife noticed that he stumbled against a chair, and she remarked that his new glasses were not effective. He replied, "No, they do not help me any more than the old ones." The next day, while walking on the street, his wife noticed that he stumbled slightly. On Sunday, Jan. 10th, she noticed that he held his fork and spoon in the left hand, instead of the right as was his custom. The condition gradually grew worse, so that by Wednesday morning, the 13th, it was necessary to feed the patient.

He was able to pass a catheter until Thursday, the 14th, but he required assistance, and after this he was not able to pass it at all. Before Sunday, the 10th, he had complained somewhat of headache, at times holding his head with both hands. When friends came in to see him he would brighten up and seem natural, but after visitors left he complained of increased pain in the head.

The patient entered the hospital January 16, 1909. The physical examination was very hurried, since the condition of the patient seemed to demand immediate interference. His eyes were open, but apparently he saw nothing. Both pupils reacted to light. It was impossible to make a satisfactory examination of the sensory nerves on account of the mental condition of the patient. The right arm was partly flexed. When told to move it he did so only after the lapse of some time and then moved it very slowly and to a very limited extent, the motion being made seemingly with very great effort. On attempting passive motion of the right arm and leg decided resistance was encountered to either flexion or extension. When the right arm or leg were lifted from the bed they would fall heavily and in their flexed position. There was no apparent change in the tendon reflexes except possibly a slight increase in that of the right patella. Motion of the left arm and leg were normal.

The patient was operated on at once. The left parietal region was exposed by a curved incision and the skull was penetrated with a burr drill just above the temporal muscle. On exposing the dura no discoloration could be seen. After incising it a bloody fluid, having the appearance of venous blood, somewhat diluted with serum, was expelled by successive pulsations, evidently due to the pulsations of the brain. The amount of fluid thus expelled must have amounted to at least six ounces. An instrument inserted into the opening could be carried down in every direction for a distance of from 1½ to 2 inches. After enlarging the opening and washing out the cavity with saline and drying it with absorbent gauze, the brain could be seen pushed back from the parietal bone, flattened and covered with pia mater, but not lacerated as far as could be seen. There were some plates of coagulated fibrin on the anterior surface of the dura mater, but none could be seen on the pia mater. The hæmorrhage was easily controlled except at one point. This apparently came from the meningeal artery close to its orifice from the bone, and as it did not seem possible to secure it by ligature, a clamp was placed upon it, clamping the dura mater against the bone. A cigarette drain was inserted into the bony opening, but was not carried inside of the skull. The integument was then sutured except for the exit of the cigarette drain and the forceps upon the meningeal artery. An abundant dressing was applied in order to absorb all discharge.

The subsequent history of the case presents some points of interest. While recovering from the anæs-

thetic the patient struggled considerably and seemed to use the arms and legs on both sides equally well. Within an hour after operation, while the movements of the right arm and leg were somewhat slow, they were made with a definite purpose. The patient was able to speak in sentences and that evening he said he felt well, and would smile when spoken to. On the morning following the operation the patient spoke in sentences and recognized his attendants. He made mistakes, however, in pronouncing some words.

The first dressing was made on the 18th, when a large amount of serum escaped. On the 20th, the patient, who is an engineer, gave intricate mathematical formulæ with reference to friction.

On Jan. 21st, the dressing was changed the second time and it was thought wise to omit the cigarette drain.

The patient's condition remained satisfactory until Jan. 24th, three days after the removal of the drain, when in the afternoon he became mentally confused. At 8 P. M. he got out of bed and wanted to go home. At this time the right arm became flexed and somewhat rigid. This condition continued on the next day. He was markedly confused mentally, the right arm remained flexed and the thumb was flexed definitely into the palm of the hand. There was an absence of knee jerk, ankle clonus, Babinsky or other tendon reflexes upon the right side. The reflexes on the left side could be occasionally elicited, but they were not regular. In dressing the wound a pair of dressing forceps were inserted through it into the cavity formerly occupied by the hæmorrhage. Several ounces of serum escaped. A cigarette drain was reinserted and its use was continued in subsequent dressings until the escape of serum had ceased and the wound had nearly closed. With the removal of the accumulated serum the symptoms of compression which had returned ceased, and the further progress of the case was satisfactory in every way. The patient was soon up in a wheel chair and went to his home, and he is now, May 5th, in his usual health.

The invitation to read a paper before this body came shortly after operating upon this second case. My interest in it was such that when asked for the title of my paper I suggested that of traumatic cerebral hæmorrhage. Had I looked into the literature of the subject before this time I question if I should have ventured to discuss a theme which has already received such extensive consideration. Many papers have been written and several careful collections of cases have been made. On looking over the cases, however, I find that there are relatively few in which the symptoms of compression from hæmorrhage has been delayed later than a few hours, or at most from two or three days.

I have myself seen several cases in which the symptoms of compression developed early. The interval before operation in my two cases just reported was 46 days and 66 days respectively.

In the presentation of this subject for your consideration an arbitrary period, not less than two weeks from the time of injury to that of operation has been selected. On the other hand only cases of hæmorrhage are included, those of cyst formations being simply referred to, although cysts are doubtless the terminal stage of certain hæmorrhages.

Although it might prove interesting to discuss the whole subject of traumatic cerebral hæmorrhage, this paper will be limited to a consideration of cases of hæmorrhage, both epi- and subdural, without apparent involvement of the tissues of the brain itself, although it is quite probable that in some cases other brain lesions may be associated with those of hæmorrhage. The hæmorrhage may result from a trauma without fracture of the skull, or at most one of limited extent and with little if any depression of bone. That cerebral hæmorrhage may result from slight violence is well known, as well as the fact that the hæmorrhage may be at the site of the trauma or by contrecoup upon the opposite side of the cranium. The sources of hæmorrhage may be the sinuses, the vessels of the pia or the brain itself, possibly the diplœ but especially the middle meningeal artery. It is possible that the vessels of the pia may be torn at their entrance into the longitudinal sinus by the violence of a fall, partially dislocating the brain within the cranium.

After entering the skull for a short distance the middle meningeal artery may be wholly enclosed in a bony canal or may deeply furrow the temporal bone and be covered by the dura mater. Steuer says the artery is enclosed in a bony canal in thirty cases out of one hundred.

An examination of 30 skulls which has been made for me shows this condition to exist on one or both sides in 23 cases. The portion of the artery enclosed in the canal is the first part of the anterior branch, the upper limitation of the canal reaching up nearly to the temperoparietal suture. In the upper part of its course the artery lies upon the dura. This close connection of the artery with the bone makes it evident why a blow upon the skull may with slight fracture, or without any frac-

ture, cause a laceration of the artery. Should the meningeal artery be torn without at the same time penetrating the dura mater, an epidural hæmorrhage must result. Should the dura be ruptured by the same violence the hæmorrhage will be between the dura and the pia mater. Rarely both may occur simultaneously.

As cases were collected and studied it became evident that those in which symptoms of cerebral hæmorrhage developed might be cases of either extra- or subdural hæmorrhage.

In the twenty-seven cases collected, in which two weeks or more elapsed between the injury and the operation, all save one were cases of subdural hæmorrhage. One involved the surface of the brain.

The symptoms of extra- and subdural hæmorrhage are similar. Phelps (Annals of Surgery, vol. xliv, 1906, p. 807) in an excellent paper on injuries of the head says, "It follows that these two forms of hæmorrhage (extra- and subdural) are not distinguishable from each other. In short, a hæmorrhage is a hæmorrhage, wherever it is situated and its location can only be indirectly established if at all, whether it be pial, epidural or cortical."

While this statement is perhaps too strong to meet universal acceptance, and while it is to be hoped that further observation may increase the accuracy of diagnosis, the fact remains that we are as yet unable to diagnosticate definitely as to whether an injury to the head has produced a simple concussion, a hæmorrhage or a laceration of the brain, and Hutchinson remarks that laceration of brain may give most of the signs of ruptured meningeal artery. In this connection Phelps has pointed out the importance of temperature as a factor in diagnosis. He says (idem, p. 802), "The pulse, temperature and respiration must be taken frequently and systematically. If after the lapse of hours consciousness still remains in abeyance, a stationary temperature but one or two degrees above normal will indicate a hæmorrhage of some profusion without serious central injury; but a higher elevation, which constantly increases, with possible recessions, will point to visceral lesion." He further says (idem, p. 808) that the degree of temperature will measure the amount of injury to cerebral tissue, and (idem, p. 819) that in a study of more than one thousand cases of intracranial injury there was no instance of recovery when a temperature of 105° was exceeded by the smallest fraction.

It is not the purpose of this paper to discuss cases of extensive injury to the skull, causing damage to the brain itself and accompanied by evident fracture of the vault of the skull with depression, or of the base with hæmorrhage from the ears, etc., but rather those cases in which the injury has as a rule been seemingly slight. Often the patient has simply fallen down, striking the head upon a hard object, or has been struck a light or perhaps a glancing blow. In some, complete unconsciousness has resulted, while in others the patient has been dazed but momentarily.

Mr. Hutchinson (London Hosp. Report, vol. iv, p. 49) has said: "It is certain that the value of the lucid interval before coma as a symptom of ruptured middle meningeal artery can scarcely be over rated. It is worth all the rest put together."

This remark seemingly applies to all intracranial hæmorrhage, the result of trauma and causing slow accumulation of blood, whether the blood be extra- or subdural, and whether it come from the middle meningeal artery, the pia, or the venous sinuses.

A few cases of hæmorrhage have been reported in which no lucid interval has followed the receipt of the trauma, but these cases are rare.

In almost all cases the unconsciousness, total or partial, produced by the trauma has been followed by a lucid interval partial or complete, lasting sometimes but a few moments, or hours, while in other cases symptoms of compression have not appeared until after the lapse of days, weeks, or even several months.

Pearce Bailey (Diseases of Nervous System, p. 100) says: "In the large number of fatal cases the primary unconsciousness is recovered from for a brief interval, if at all." The symptoms usually come on rapidly and death ensues in from twelve to forty-eight hours. The prognosis is better when the symptoms develop slowly. He further says that the length of the lucid interval is usually only a few hours.

CASES SHOWING

No.	Age.	Sex.	Period of unconsciousness.	Interval until return of symptoms.	Time till operation.	Point of injury.	Point of operation.
1.	57.	M.	Short.	42 days.	46 days.	Rt. parietal.	1st, rt. parietal; 2d, left parietal.
2.	71.	M.	Short.	58 days.	66 days.	Left parieto-frontal.	Left parietal.
3.	53.	M.	Short.	20 days.	63 days	Left forehead.	Left.
4.	69.	M.	Short.	18 days.	24 days.	Rt. temple.	Rt. temple.
5.	24.	M.	Several hours.	14 days.	16 days.	Vault, 2 wounds. Occiput, 1 wound.	Left parietal.
6.	62.	M.	Short.	2–3 weeks.	76 days.	Vault.	Rt. parietal.
7.		M.	Short.	6 weeks.		Left temple.	Left parietal.
8.		M.	Dazed only.	21 days.	37 days.	Left parietal.	Left side.
9.		M.	1–3 hours.	8 weeks.			
10.	30.	M.			1st, 13 days; 2d, 14 days.	Right side.	1st, right; 2d, left.
11.	21.	M.	Little if any.	1 week.	16 days.		Left parietal.
12.	20.	F.	None.	Gradual.	149 days.	Right side.	
13.	44.	M.	1–2 minutes.	4 weeks.	5 weeks.	Back of head.	Left.
14.	57.	M.	10–15 minutes.	About 2½ mos.	91 days.	Malar bone.	Rt. parietal.
15.	50–60.	M.	Few minutes.	52 days.	67 days.	Back of head, left side.	Left parietal.
16.	63.	M.	None.	8 months.	9 months.	Rt. parietal.	Rt. side.
17.	23.	M.		3 weeks.	24 days.	Left parietal.	Left parietal.
18.	69.	M.		5 weeks.	6 weeks.	Rt. parietal.	Rt. parietal.
19.	29.	M.	Few minutes.	4 weeks.	4½ weeks.	Rt. parietal.	Rt. parietal.
20.		M.	None.	15 days.			
21.	26.	M.		14 days.			Trephined point of injury.
22.							Right side.
23.				2 months.		Rt. parietal.	
24.	Adult.	M.	One hour.	5–6 months.	6 months.	Left occipito-parietal.	
25.	Adult.	M.	None.	21 days.	25 days.	Left parietal.	Left parietal.
26.	Dawbarn.	Operation.	Clot not found. At	post-mortem, clot	found in left motor	area. Paralysis of same side.	Dr. Gray reported that fibres
27.	40.	M.	20 minutes.	7 weeks.	87 days.	Left side.	Left parietal.

CYSTIC CLOT.—Taylor and Ballance cite case of blood clot removed on third attempt measuring 7 inches long and 4½ by 1½ transversely.

"It may, however, be protracted for two or three days."

Purves Stewart is reported as saying, "A lucid interval, when followed by the above symptoms (drowsiness, stupidity, and coma) generally indicates that the hæmorrhage is extradural."

As to the correctness of the latter view we are uncertain. Accumulating experience seems to emphasize the difficulty of distinguishing between the location of hæmorrhage whether extra- or subdural. One thing seems positive, if an opinion may be based upon the twenty-seven cases reported, and that is that long delayed symptoms of cerebral compression indicate positively that the hæmorrhage is subdural.

In the cases reported, in which an interval

LATE MANIFESTATIONS

Side paralyzed.	Eye symptoms.	Fracture.	Result.	Fluid obtained.	Location of clot.	Remarks.
Right.	Normal.	No.	Recovered.	Dark fluid and clot.	Subdural.	Contrecoup.
Right.	Pupils equal cataract.	No.	Recovered.	Dark fluid.	Subdural.	
Right.	Both pupils react to light. Neuritis both eyes.	No.	Recovered.	Brown fluid.	Subdural.	
Left.		No.	Recovered.	Brown fluid.	Subdural.	
Right.		No.	Recovered.	Dark clot.	Subdural.	
Left.	Pupils dilated, unequal.	No.	Recovered.	Dark fluid.	Subarachnoid.	Symptoms of pressure returned. Reopened.
Unconscious.		?	Recovered.	Large clot.	Probably subdural.	
Right.	Nothing shown by ophthalmoscope.	?	Recovered.	Large clot.	Subdural.	
		No.	Recovered.	Dark fluid and clot.	Subdural.	2d operation in 6 mos. Died in one year.
Right and left. Convulsions.	Pupils equal and normal.	Linear not depressed.	Recovered.	1st clot; 2d clot.	1st, epidural; 2d subdural.	Two operations.
Right little more than left.	Normal.	No.	Recovered.	Dark fluid and clot.	Subdural.	
None.	Blind, rt. eye; deaf, rt. ear. Left eye and ear normal.	No.	Recovered.	Clot.	Subdural.	Opened 2d time.
Right.	Rt. pupil slightly dilated. Optic neuritis. Both pupils react.	No.	Died six days after operation.	Dark fluid.	Subdural.	Probable infection.
Left.	No pupillary reaction.	No.	Died in 7 days.	Clot.	Subdural.	
Right hand.		No.	Recovered.	Dark fluid and clot.	Subdural.	
Left hand less power than right.	Pupils normal.	No.	Recovered.	Reddish serum and clots.	Subdural.	
Convulsions rt. side.	Pupils dilate equally.	No.	Recovered.	Clot.	Subdural.	
Left arm and leg.	Pupils both dilated. Do not react to light; otherwise normal.	No.	Recovered.	Clot.	Subdural.	
Convulsions left arm.	Normal.	No.	Died. Blood clot in rt. side anteriorly.	Injected surface.	Clot at postmortem.	Contrecoup.
Aphasia.			Died 23d day after drinking.	Dark fluid.	Subdural.	
Difficulty in speech.		Knife wound.	Recovered.	Dark blood.	Subdural.	
Right extremities.			Recovered.	Brownish red fluid.		Collateral hemiplegia. Op. same side.
Left.			Recovered.	Blood.	Subdural.	
			Recovered	1 oz. bloody serum.	Subdural.	
Right.			Recovered.	Clot.	Subdural.	Knife injury.
had not crossed in medulla,	but had gone down on same	side.				
Right.			Recovered.	Dark red fluid.	Subdural.	Thick wall below called cystic clot, ordinary case.

of two weeks has been arbitrarily selected, every hæmorrhage has been subdural. It might be said, however, that it was found impossible to tabulate cases with entire satisfaction. The symptom selected to indicate hæmorrhage was paralysis. In some cases this was preceded by other symptoms such as headache, dizziness, etc., while in a few no symptoms of paralysis had occurred in the interval of two weeks. In a few almost the first symptom was unconsciousness or a convulsion.

The location of the hæmorrhage is commonly over the lateral surface of the brain. In extradural hæmorrhage, arising most commonly from the anterior branch of the middle meningeal artery, the hæmorrhage corresponds to the distribution of that artery.

In subdural hæmorrhage this is also the

most common location, though a clot may develop well down toward the base of the cranial cavity.

The amount of blood varies. In some cases a clot has been found "the size of an almond" while in others clots have been found at operation occupying a considerable part of the cranial cavity, pressing the lateral lobe of the brain downward and toward the median line, a distance of one and a half inches, and flattening the convolutions of the brain.

The exact amount of displacement is difficult to determine, nor is it often possible to measure accurately the amount of blood removed during an operation. It has often been described as four or even six ounces. It is stated, however that diminution of the cranial contents by one-sixth of its volume is invariably fatal.

The symptoms following hæmorrhage and the order in which they develop seem by no means regular.

After a lucid interval of varying length the patient may in a short time develop symptoms of compression with drowsiness, slow breathing, slow and full pulse, and perhaps convulsions, together with partial or complete paralysis of one or more of the extremities. In cases in which the symptoms develop slowly the first complaint may be of headache, or an indefinite sense of pressure in the head. Dizziness may follow with difficulty in walking. The patient may become somewhat stupid or morose. There may be sudden attacks of vomiting. Finally, the patient may lie in bed in a semicomatose condition. When roused he may answer questions correctly though slowly and with much apparent effort, and there may be disturbances of sensation, reflexes, etc. Sometimes an arm or a leg may be held in a fixed position, commonly somewhat flexed. The patient may resist efforts to bend or extend the member. This symptom has repeatedly caused errors in diagnosticating the location of the hæmorrhage. Since the patient permitted one arm to be placed in any position, but resisted motion with the other, the flaccid arm has been looked upon as paralyzed, indicating hæmorrhage upon the opposite side of the brain. The arm in spastic contraction and simply resisting motion has been regarded as the unaffected one, with uninjured brain center. As a result the skull has been opened upon the wrong side and the offending blood clot has not been found. An observation which may prove of some value in the location of the clot is, that on the contralateral half of the thorax there may be decreased motion in respiration.

The significance of eye symptoms, from observations made thus far, appears to be uncertain. In some cases reported the eyes were seemingly normal. In a few cases blindness has occurred, in other cases the pupil of one side has been dilated, while on the other side the reaction to light has been normal. Hutchinson remarks that irregularity of pupils is rarely present in intra-arachnoid extravasation, and hemiplegia is not so marked as in subcranial extravasation. Phelps (loc. cit., p. 806) states that in those cases in which only one pupil was dilated hæmorrhage was upon the same side in all, but in two cases it was on both sides.

In those cases in which the pupil of one side only has been dilated, this condition is supposed to arise from the pressure of the blood clot on the third nerve of the same side, causing paralysis of the nerve. It has been thought that with injuries to the skull the presence of a dilated pupil, therefore, pointed to a hæmorrhage upon the same side of the skull, but observations show that the symptom does not always permit of this conclusion. Phelps has pointed out (loc. cit., p. 808) that "Dilatation of a single pupil may follow hæmorrhages in other locations than in the middle fossa of the same side as claimed by Hutchinson and may occur in cerebral lesions other than hæmorrhage."

The eyegrounds may show signs of intracranial pressure, but in some cases of hæmorrhage of the brain there has been an absence of any changes in the eyeground. Wiesmann says "In seventy cases of meningeal hæmorrhage, thirty-nine cases showed dilatation of both pupils without reaction. In seven both pupils were contracted. In twenty there was dilatation on the side of extravasation. In four there was dilatation on the opposite side." From our own cases and those presented in the table it is evident that the condition of the pupil and the disk are of very uncertain aid in diagnosis.

Another symptom of cerebral hæmorrhage is increased blood pressure, and it was formerly customary, for its relief, to resort to bleeding. It seems, however, that the increased blood pressure is probably a provision of nature to supply the brain with the blood of which it has been deprived by the pressure of blood accumulated within the skull, thus causing anæmia of the brain itself. It is, therefore, a compensatory effort to overcome anæmia of the brain. When the intracranial pressure has become so great as to overcome the action of the vagus, the blood supply of the brain itself is diminished and death results.

In quite a number of cases among other symptoms has been that of dizziness, and some patients have had sudden attacks of vomiting coming on apparently without any special cause. Constipation is also mentioned as occurring frequently.

Considerable importance in diagnosis should be attached to symptoms of localization in determining the site of the hæmorrhage and the consequent operation. Focal disorders affecting the muscles of the extremities seemed to be uninfluenced by the location of the hæmorrhage, that is, whether the clot is extra- or subdural. On the other hand the pressure of a subdural clot at the base of the brain may be indicated by its pressure upon the nerve trunks before their exit from the cranial cavity.

Walton has said that in cases of injury with symptoms developing upon the same side one should be guided as to the point of operation not by the injury to the outside of the skull, but by the location of the injury as pointed out by the localizing symptoms.

In cases in which the development of symptoms has been considerably delayed there may be twitchings of the muscles which receive their nerve supply from the part of the brain compressed by the blood clot. In a number of cases there have been twitchings of the eyelids upon the opposite side. As has already been pointed out, pressure upon the arm or leg center may develop symptoms in the arm or leg on the opposite side of the body. In my own cases these symptoms did not develop for weeks after the injury and when they appeared they came on slowly, that is, there was in the beginning a slight unsteadiness of gait, or slight difficulty in using the hand or arm, or both these symptoms were associated. As time goes on the difficulty may increase until the patient can move the arm or leg only slowly or with very great effort, although the movements of the extremities on the opposite side of the body may be normal. Another striking feature is the slow cerebration of the patient. A patient may be in a somewhat stupid condition, but when roused may answer questions correctly although slowly, but afterward he will lapse again into a period of stupidity and probably partial unconsciousness. Finally, as the pressure increases, the patient may remain in a state of unconsciousness with stertorous respiration.

From the symptoms it may be very difficult to determine whether the clot is extradural or subdural. Prescott Hewett states that the middle meningeal artery is the source of intracranial hæmorrhage in nine-tenths of all cases.

Bowen (Guy's Hospital Reports, 1905, p. 2) says that hæmorrhage from rupture of the middle meningeal artery within the skull is usually extradural and is usually associated with fissured fracture of the skull.

Jacobson (Guy's Hospital Reports, 1886, p. 159) states that in 70 cases of meningeal hæmorrhage, fracture was present in 62. Of these 62 cases fracture implicated the base as well as the vault in 38. In 4 there was no fracture. In 3 cases which recovered no fracture was discovered. In 1 there was no evidence whether there was fracture or not.

If the dura is torn, however, the blood will be subdural and Bowen cites 3 cases, one of his own and 2 of Jackson's as probably of this kind. It seems somewhat doubtful, however, if the source of hæmorrhage in some of the cases reported has been definitely established. Inasmuch as the skull at operation ordinarily is not widely opened, and inasmuch as considerable hæmorrhage may arise from the operation itself, it evidently must be very difficult to determine the origin of the primary hæmorrhage, and it is by no means certain that the reports as to the origin of hæmorrhage are always correct. A very interesting discussion of the sources of intracranial hæmorrhage will be found in an article by Phelps to appear in the May number of the Annals of Surgery.

His observations are based upon post-mortem examinations, and would seem to strengthen the view that it must often be difficult to determine at operation the exact source of hæmorrhage.

Bowen remarks (idem, p. 55): "I venture the opinion, recognizing, however, that the evidence I have put forward is purely negative, that the compressing blood is derived in most cases from the vessels of the pia mater and those running in the subarachnoid space. In a small proportion of cases the blood is derived from the corresponding middle meningeal artery or one of the sinuses of the dura mater."

The rapidity with which the blood may accumulate is a matter of very great uncertainty. It has been suggested that concussion by the disturbance of circulation may for a time hinder hæmorrhage.

Wharton has remarked (Wounds of the Venous Sinuses of the Brain, Annals of Surgery, 1901, vol. xxxiv, p. 103): "The diagnosis of wounds of sinus of the brain must, therefore, be made largely upon the site of the injury, the character of the blood which escapes, and in cases in which no external wound exists, by the slow development of symptoms of cerebral compression."

While Wharton's conclusions are generally correct it must be remembered that some of the cases in which the symptoms have been unusually long in developing have been hæmorrhages in which the sinuses of the brain were not involved.

The symptoms of hæmorrhage do not seem to enable one to reach any definite conclusion concerning the size of the clot, since in some cases with grave symptoms only small clots have been found. A point in diagnosis has been suggested by Cushing. He remarks that in extradural hæmorrhage from injury of the meningeal artery or venous sinuses the fluid withdrawn by lumbar puncture is clear, while in cerebral or subdural hæmorrhage it is stained with blood. While this point of diagnosis may be of much value immediately following an injury, it is probable that the blood would have disappeared from the spinal canal in cases in which the development of symptoms has been long delayed.

The amount of fluid which has been removed at the time of operation has been variously estimated at from 1 to 6 ounces, but the cases as reported would lead one to believe that the amount of the clot was estimated rather than absolutely measured. In one of my cases it was possible to insert an instrument into the exposed cavity 2½ inches, both anteriorly and posteriorly, from the point of opening, and from the skull to the surface of the brain, a distance of about 1½ inches. It is of course difficult to estimate with accuracy just how large a quantity of fluid such a cavity would contain. Six ounces would not seem to be an over estimate.

The slow development of symptoms has been ascribed to a slowly accumulating hæmorrhage. It is of course possible that blood may for a long time continue to escape from an injured vessel, but it has seemed to me that the slow development of symptoms might better be accounted for as follows: As a result of hæmorrhage a certain amount of blood is poured out. This may not be so great as to prevent the recovery of consciousness and the patient may for a considerable time remain in a seemingly normal condition. Later, the blood clot, acting as a foreign body, may cause the accumulation about it of serum and with this gradual accumulation of serum the symptoms of pressure increase. The primary clot may form definite limitations at its periphery. The later accumulation of serum may find less resistance in compressing the brain than in overcoming the peripheral adhesions and may thus depress the brain.

Two observations have led me to this conclusion. In the first place in my own cases and in some of those cases reported by others, no well formed blood clot has been found, but a dark colored fluid containing perhaps particles of clotted blood. On observation of the cavity from which this material has been removed, in some cases thick layers of lymph have been found deposited upon the dura mater. In the second case which I have reported, the patient was immediately relieved by operation and regained motion and consciousness in a few hours. His condition continued to improve as long as the cigarette drain was employed to keep the opening down to the brain patent. After a few days this cigarette

drain was removed, when all of the symptoms of compression returned. Immediately upon opening the wound and carrying a pair of dressing forceps down into the cavity there was a discharge of several ounces of clear fluid. With this discharge all symptoms of pressure again rapidly disappeared but recurred several times when the discharge of serum from the cavity was not perfectly free. It has seemed to me that the fluid collecting at the point of hæmorrhage after injury might be similar to that collected at the same place after operation, and just as the symptoms of compression followed the retention of this fluid through the absence or inefficiency of the cigarette drain, in the same manner the pouring out of serum about a clot may cause symptoms of slowly increasing pressure.

In this connection the formation of what are called blood cysts is of interest. Some cases, so described, appear to be those in which the fibrin of the blood has been deposited upon the inner surface of the dura. In reaching the accumulated fluid it has been necessary to perforate a layer which has the appearance of a cyst wall. Below this a dark colored fluid has been found, but below the fluid could be seen the flattened surface of the brain covered only by the pia. Such a case is No. 27.

Taylor and Ballance, however, describe a cyst with well formed walls. This was removed entire and measured 7 by 4½ by 1½ inches. In some cases of long standing such cysts have caused absorption of brain tissue. I operated upon one which opened into the lateral ventricle.

It is probable that in some cases clots are liquefied and absorbed. This is indicated by the slow disappearance of symptoms and seems more likely to occur in subdural hæmorrhage, on account of the more abundant lymph vessels of the pia. These lymph vessels probably take up the gradually liquefied blood clot.

As to the treatment of cases of hæmorrhage there is of course nothing which offers permanent benefit except operation and the removal of the accumulated blood and serum. I do not wish to go into the details of the operation. In as much as the collections of fluid are chiefly in the parietal region, more frequently anteriorly than posteriorly, this is the point at which operation is to be performed, and one may be aided in the localization of the lesion, as has already been said, by the symptoms produced by pressure upon the centers controlling the motion of the extremities and the center of speech. The most common point of hæmorrhage, whether it be extradural from the injury of the meningeal artery or whether it be subdural, is in the anterior parietal region, two fingers' breadth behind the outer side of the orbit and a little below the upper portion of the orbit. This brings one about to the anterior inferior angle of the parietal bone, and it is usually at this point that the bone is crossed by the middle meningeal artery. In some cases the hæmorrhage is from the posterior branches of the meningeal, however, and under such circumstances the hæmorrhage may develop posteriorly and if one has opened the skull anteriorly, failing to find the fluid at the point of operation or in its immediate vicinity, it may be necessary later to open the skull at the posterior portion of the parietal bone. This has been pointed out by Krönlein. The bone flap method is advocated by Krause.

Troublesome hæmorrhage from the middle meningeal may be controlled by placing upon the skull a hemostat, upon the inner jaw of which is a piece of rubber tubing. This will press the artery against the skull and the forceps may be left in situ for a couple of days. The forceps may be included in the dressing and provide good drainage without detriment to the patient. It is important that all clots be thoroughly cleared away, and that strictest asepsis be employed, since otherwise pressure symptoms may not be relieved and the remaining clots before being evacuated may give rise to infection and meningitis.

To reach all clots an opening of considerable size may be necessary. This opening may be closed at a subsequent operation by a bone graft, such as I have fully described in Boston Med. and Surg. Journal, April 2, 1906. The method is one I have employed repeatedly and always with success. Later observations have shown that the bone grafts have closed the opening with a solid wall of bone. It seems that such a bony covering must be of value as a protection against accident and by decreasing the possibility of the later develop-

ment of epilepsy, resulting from the pressure of the cicatrix.

CASE 1. Allen. See text.

CASE 2. Allen. See text.

CASE 3. Armstrong, Journal American Medical Association, 1887, vol. viii, p. 679. Male. Age 53 years. Was struck on forehead by brick, Feb. 27, 1887. Unconscious for a short time. April 18th, noticed tendency to drag right foot. April 19th, fell forward on table suddenly, right arm and leg paralyzed. Examined April 24th. Both pupils small and respond to light. April 29th, opthalmoscope showed the optic nerve of the right eye red, border indistinct, veins large and somewhat tortuous. Left eye same. Diagnosis, optic neuritis. Operated May 1st. No fracture found. Dura mater dark. No pulsation. On opening dura dark brown fluid blood was found. Patient made good recovery.

CASE 4. Hulke. Lancet, 1883, vol. ii, p. 814. Male. Age 69 years. Admitted to hospital Oct. 21, 1881. Received injury of head fourteen days previously. Ecchymosed lump on right temple two fingers' breadth behind angular process of frontal bone just below the temporal ridge. Had been struck a glancing blow on right temple by falling ladder. Was stunned for a few minutes but recovered and went to his work and continued work the remainder of the day. Third day after accident headache was severe and gave up work. On fifth day was lethargic, on following day had retention of urine. Gradually grew more apathetic. On Nov. 1st, spastic rigidity of right arm with twitching. Same day trephined at point of injury. No fracture. Dura mater appeared normal. No pulsation. On opening the dura a brown fluid escaped, estimated at from 3 to 4 drams. Day following operation rigidity of arm disappeared. Dressing soaked with turbid brown fluid. Improved gradually. Recovered.

CASE 5. Golding Bird. Guy's Hospital Report, 1901. Report 586. Male. Age 24 years. Injured Nov. 1st. Knocked down from behind. Rendered unconscious. Still unconscious when admitted to hospital. Two wounds over vertex and one over occiput. On 4th, complained of severe pain in frontal region. Discharged from hospital Nov. 6th. Readmitted to hospital Nov. 16th. Had suffered from headache during that period. Previous to readmission to hospital had developed squint and soon became totally blind. Speech difficult. Right arm at times paralytic and at times rigid. Marked aphasia. Operated Nov. 16th. Trephined. (From report probably on left side.) Dura mater dark brown color. Dark colored blood slowly welled up after incising dura mater. Nov. 29th discharged seemingly well.

CASE 6. Harris. Lancet, 1904. Vol. i, p. 1199. Male. Age 62 years. June 21st, knocked down by stone striking top of head. Stunned short time. Able to walk home. After two weeks partial loss of power in right leg. Later loss of power on left side. No mental symptoms until about a month after accident. Admitted to hospital Aug. 17th. Patient talkative and restless. Pupils unequally dilated. Examination of interior of eye unsatisfactory. Left arm wasted, with contracture to angle of about 70°. To straighten arm caused marked pain. Fingers strongly retracted in palm of hand. Both limbs rigid. Left more than right, the left being in a condition of spastic rigidity with adduction. Sept. 5th, trephined over right motor area. Dura mater yellow and opaque. Pulsation diminished. On incising, arachnoid bulged upward, appearing dark and somewhat greenish. On incising this deep claret colored clot protruded. Altered blood clot and serum poured out, estimated at four ounces. (Question whether the layer of coagulated lymph was not mistaken for arachnoid.) Improved rapidly. On Sept. 11th, rigidity of arm and leg returned. On 12th, wound reopened. Clots around the opening removed. Sept. 16th, epileptiform convulsions. Clonic spasms in both arms and legs. Sept. 24th, paralysis completely disappeared. Mental condition improved. Left hospital Nov. 19th.

CASE 7. Keen. American Journal Medical Association, 1901. Vol. xxxvii, p. 633. Male. Thrown from street car. Injured over left temple. Scarcely unconscious. Only stunned. Kept in hospital three days and discharged. Six weeks later became duller and finally unconscious. Returned to hospital. Trephined on left side. Vast clot found, extending from frontal to occipital region. Opened posteriorly and a drain passed from anterior to posterior opening. Recovery from operation rapid. Slightly aphasic at time of report.

CASE 8. Kiliani. Annals of Surgery, 1901. Vol. xxxiii, p. 325. Male. Injured May 5th. Struck in left parietal region by a brick. Did not become unconscious but was dazed for a short time. May 20th, did not use right hand well. May 22d, violent frontal headache. May 26th, dizzy and almost fell. June 1st, slight hesitancy in speech. Increased up to time of admission to hospital on June 6th. June 7th, took little notice of surroundings and was somnolent. Slight spastic paresis of right arm and hand, less in right leg. Ataxia in both arms. Partial motor aphasia. Opthalmoscopic examination showed nothing abnormal. Pulse 60 to 94. Respiration 12 to 24. June 11th, operated on left side over injury. Dura tense, nonpulsating, dark color. Clot covering practically the entire left hemisphere evacuated. Recovery rapid. Aug. 19th, patient perfectly well and attending to business.

CASE 9. Kamerer. Annals of Surgery, 1901. Vol. xxxiii, p. 325. Male. Fell from bicycle. Unconscious for short time. (Estimated variously from one quarter to three hours.) At end of ten days felt perfectly well. Six weeks after accident began to complain of headache. Symptoms increased in severity for two weeks. Trephined. Large amount of dark fluid and much clotted blood found behind dura. Blood clot was about ¼ inch thick, lying upon brain and above this was the colored fluid. Brain separated from skull about 1½ inches. Patient recovered. Free from symptoms for a considerable time. Six months later second operation. Patient died in about a year.

CASE 10. Dawbarn. Annals of Surgery, 1907, vol. xlv, p. 161. Male. Age 30 years. Seen on Nov. 21, 1905, twelve days after receiving a severe blow from a club on right side of head. History unsatisfactory, except that patient complained much of headache after injury and seemed increasingly stupid. Had been entirely unconscious during three days previous to admission. Both eyes directed sharply to right. Pupils equal and of normal size. Evidence of but one wound on right over Rolandic fissure. Linear undepressed fracture distinguishable. Thick blood clot exposed. Clot extended well down to base of brain. Considerable hæmorrhage from fracture down toward base controlled by packing. After this operation no recurrence of left side convulsions. Patient became partly unconscious and eyes no longer turned to right. Forty-eight hours later, severe chronic convulsions of entire right side. Operated second time. Operation over left Rolandic area of skull. Dura bulged strongly into the opening. No pulsation. On opening dura an extensive partly organized clot was found. Rapid recovery.

CASE 11. Carson. American Journal of Medical Sciences, vol. ciii, 1902, p. 134. Male. Age 21 years. Injured by fall. A week later suddenly became unconscious. Shortly afterward had difficulty in speaking. First seen 13 days after injury. For the three days preceding this had been unable to speak. Pulse down to 54. Patient seemed to understand what was said to him. Left nasolabial fold more marked than right. Right cheek puffs on attempting to whistle. Tongue diverges to right. Grip of both hands about equal. No difference noted between right and left legs and arms. Seemed to be able to write figures but not letters. Day later grip of right hand seemed to be less than that of left. Operated April 29, 1891. Left side, 1¼ inches behind the external angular process. Dura dark and cloudy. No pulsation. On opening the dura clot found extending in all directions. On raising dura a stream of dark semiliquid blood forced itself through the supervening layer of clot, being projected a distance of three feet. Thickest part of clot immediately under anterior branch of middle meningeal artery. Recovery rapid. Dismissed May 18th. Oct. 15, 1901, patient in good health, working in a brick yard.

CASE 12. Hamilton. Journal American Medical Association, 1894, vol. xxiii, p. 952. Female. Age 20. Struck on right side of head just posterior to Rolandic fissure on June 18, 1893. No record concerning unconsciousness. Severe headache. Gradually lost sight in right eye, becoming totally blind. Deafness began almost immediately in right ear. No motor paralysis. Vision and hearing normal on left side. Ophthalmoscope shows O. S. normal. O. D. slightly vascular. No evidence of past or present neuritis. Operated Nov. 15th. Dura mater normal. Incised dura. Passed silver wire loop down to optic commissure. On withdrawal of wire a firm, round, coagulum body, 3 cm. in length followed the wire. This was repeated a second time. Patient rallied well from the operation. On second day had convulsions with total loss of consciousness and spasmodic contractions of left arm and hand. Wound reopened. Other coagula were removed. Nov. 18th, patient re-examined and in good health.

CASE 13. Stewart. British Medical Journal, 1887, vol. 1, p. 877. Male. Age 44 years. Admitted to hospital Feb. 22, 1887. On first of Jan. had fallen on back of head. Lost consciousness for a minute or two. Remained well for a fortnight when he began to have pain with severe headache. Week later pain was so severe that patient was unfitted for work. His legs were feeble and his walk was unsteady and staggering. Head showed no marks of injury. Movements of eyes and eyelids were normal. Right pupil slightly larger than left. Both pupils reacted and were normal. Ophthalmoscope showed optic neuritis of both sides. No loss of power in any individual muscle or group of muscles. On Feb. 26th gait was unsteady, tendency to vomit, increasing stupidity and torpor. Tapping over triceps and biceps induced movement on right side but none on left. Feb. 28th, condition approached one of coma. Right arm and leg distinctly paralyzed. Aphasia well marked. March 1, symptoms being still more pronounced, was trephined over posterior part of third left frontal convolution. On opening the dura a quantity of serous fluid escaped, reddish brown in color and afterward dark red. Amount estimated to be about 6 ozs. The fluid extended forward two inches and backward about three inches. Copious discharge of serum for two days. Patient's condition very satisfactory. On March 3d, rise in temperature, slight rigor, nausea, and vomiting. Symptoms gradually grew worse, passing into coma, with complete paralysis of right side. Patient died at 11 o'clock on March 6th. The details of the case render it strongly probable that death was from sepsis.

CASE 14. Burns. Lancet and Clinic, 1907. Vol. xcviii, p. 82. Male. Age 57. On Oct. 27, 1905, was struck on the malar process and was unconscious ten to fifteen minutes. After twenty minutes sat up and was able to answer questions. Normal pulse. No evidence of fracture, concussion or compression. Returned to work ten days after injury without complaining of headache. Jan. 7th, patient talked in a normal manner and his gait and reflexes were apparently normal. He was advised to enter hospital for observation but declined to do so. Entered hospital on Jan. 25th. Operated Jan. 26th, history showing that few days after being seen on January 7th, he had fallen into a stupor and exhibited signs of hemiplegia. At this time he had left sided paresis, extending to the face and tongue. There was evidence of pressure over the leg, arm, orofacial and tongue areas. Marked mental hebetude. Pulse 62, temperature 98. Operated over the motor area on the right side. The dura bulged into the opening, was bluish in color and without pulsation. On incising the dura an old clot of large size spread out in all directions. Patient recovered rapidly and on the third day was able to hold a glass of milk in his left hand and flex and extend the left arm normally. The functions of the muscles of the face and tongue were restored. Patient died, however, on Feb. 2d.

Death was ascribed to pressure causing cortical atrophy followed by degeneration of the lateral columns of the spinal cord. The published account gives no history of post-mortem or microscopic examination.

CASE 15. Hume. Lancet, Sept. 19, 1908, p. 866. Male. Age 50 to 60 years. On Aug. 9, 1907, fell striking on back of head on left side. Unconscious for a few minutes. Wound healed rapidly. Felt vaguely ill afterward. During Sept. was much depressed. By Oct. 1st, began to lose power in right hand and walked with difficulty. On Oct. 29th, broke down and could no longer sign name. Retained some memory up to Nov. 14th. Examined by Dr. Hume, Nov. 1st. Patient had vomited suddenly several times. Distinct loss of power in right hand. Less distinct paresis of left leg. By Nov. 7th all symptoms had increased. Spoke with difficulty, had right facial paralysis, several times had involuntary defecation and micturition. Absence of knee jerk, ankle clonus and patella reflexes. Optic discs congested and edges blurred. Nov. 14th cranium opened on left side in posterior parietal region. Dura mater bulged outward and was bluish in color. When incised 5 to 6 ounces of porter like fluid escaped. Some clots adherent to dura but not to brain surface. Surface of the brain was depressed but rose gradually to normal level. Gauze drain inserted. Bone not replaced. Same evening patient could answer ordinary questions correctly. He could move right leg and to a slight degree extend right arm. Patient gradually improved, regained perfect speech, and the full use of both arm and leg and returned to his usual occupation.

CASE 16. Bartlett. Hahnemannian Monthly, vol. xxxviii, 1903, p. 741. Male. Age 63 years. In June, 1902, received a blow upon the head which caused him to remain sitting for a half hour. There was a wound to the right of the median line over the anterior portion of the parietal bone. That such an injury had occurred had been forgotten until the time of operation, which occurred in the latter part of March, 1904. In December the patient had developed vertigo. Early in February he developed severe headaches. In the middle of March he showed marked drowsiness and by the 25th of the month this had increased so that it was difficult to rouse the patient. An examination this time showed that the left knee jerk was more energetic than the right. The patient could be roused sufficiently to protrude the tongue. He did this in the median line. A dynamometer grasped in the right hand registered 40 and in the left 15. Pupils moderately contracted and equal. Ophthalmoscopic examination unsatisfactory. Patient was trephined just above the hair line and one inch from the median line on the right side. The dura was unduly tense. On incision there was a forcible gush of reddish serum, about 1 to 2 ounces escaping. Brain was depressed and in the bottom of the cavity was some old blood clot. Wound packed with gauze. Following morning patient was perfectly conscious and headache was gone. On the 27th patient was again drowsy but on removal of packing he improved. Several days later Jacksonian epilepsy developed with convulsions beginning in the left hand and extending to face and left leg. Convulsions were followed by paralysis of left hand. Patient never lost consciousness. Convulsions gradually decreased and disappeared after three or four days. Patient improved. Reported to the doctor's office May 3d and again on Sept. 8th as entirely well.

CASE 17. Wells. Medical Record. Vol. xli, May, 1892, p. 541. Male. Age 23 years. Was seen to fall suddenly in the street and went immediately into convulsions. He frothed at the mouth and his face became cyanosed. No history of case could be obtained and no evidence of injury except a small scar on the left side of the head anterior to and a little above the ear. This was judged to be three to six weeks old. Both pupils dilated and equal. Reflexes appeared to be normal. Temperature 102, respiration 30, pulse 120. No apparent loss of motion or sensation. During evening temperature rose to 104 and patient became delirious. Aug. 22d, the record shows that during previous night convulsions were nearly constant and patient who had been in hospital two days was rapidly failing. Diagnosis, cerebral abscess from an old injury. Skull was trephined Aug. 23d, at the location of the scar. At time of operation temperature was 105, pulse 123, respiration 22. No evidence of fracture. The dura was dark in color and presented no pulsation. On incising dura blood clot immediately protruded and a handful of blood clot was removed. The clot extended along the fissure of Rolando covering the motor areas of the face, arm, and leg. Pia appeared to be much reddened and inflamed and the brain was depressed. Opening was drained by gauze and a tube. Aug. 24th and 25th patient had several convulsions. On Aug. 25th temperature fell to 99 and continued at about that level until recovery. Discharge from wound greatly lessened. Patient regained his memory and stated that three weeks before admission to hospital he was struck upon the head. Injury had, however, caused him no trouble. For a week previous to admission to hospital he remembered that he had had headaches, and for a few days had noticed that his right arm and leg were not as strong as usual, but the difficulty was not sufficient to cause him to stop work. On Sept. 23d patient was dismissed cured.

CASE 18. Hahn. Deutsche Medicinische Wochenschrift, 1896, April 16, p. 250. Male. Age 69 years. Admitted to hospital Aug. 19, 1894. Six weeks previously had been struck in the right parietal region. Since that time patient had not felt well. Headache on right side, fretful, and easily angered. During past six days marked change in condition. Gradual weakening of left arm and leg and patient has remained in bed and been apathetic. For last two days has been unconscious. Occasionally he was very restless, grasping at the right side of head. No convulsions or vomiting. Patient answered questions only when thoroughly roused. Facial nerve of left side showed slight paresis. Left arm showed slight spastic contraction and was paralyzed. Left leg paralyzed, left hypoglossal and other cerebral nerves not involved. Pupils equal and react to light. Eye grounds normal. Eye muscles seemingly intact. Sight seemingly normal. Sensibility seems dull but the same on both sides. Pa-

tella reflexes increased. Patient gradually went into a state of deep coma. Operation at point of injury, a little above right ear. No evidence of bone injury. Dura mater was tense and bluish in color. No pulsation. On opening dura nearly 150 c. c. of clotted blood was evacuated. Cavity lightly packed with iodoform gauze. On Aug. 11th, patient's mind was clear. Spastic paralysis of left arm had disappeared and patient could move right arm and leg. Paresis of face had disappeared. Aug. 13th, no fever, patient slept well. Had good appetite. Good grip in left hand. Sept. 7th in excellent condition. Oct. 10th, patient dismissed in seemingly normal condition.

CASE 19. Korte. Deutsche Medicinische Wochenschrift, 1903, p. 118, No. 7. Male. Age 29 years. Entered hospital Nov. 30, 1901, in unconscious condition. Four weeks before he had received a blow upon the head. He was momentarily unconscious. He recovered completely and worked until the day before admission to hospital. Last evening ate supper as usual and went to bed. Suddenly in the night had a convulsion and lost consciousness. Temperature normal. Pupil reflex. Patella reflexes. Sensibility and motion of extremities normal. No anomalies in the cerebral nerves. No paralysis. Patient slept most of time. Did not respond intelligently to questions. A scar was found over the right parietal bone being adherent to the skull. Dec. 1st, typical epileptiform attack. Dec. 2d, epileptiform attacks had gradually increased and were followed by unconsciousness. In the afternoon the attacks recurred about once in two hours. Patient would throw himself upon right side. There were convulsive movements first of the left arm and then of the right. Attacks lasted about two minutes. Patient became wholly unconscious. Dec. 4th, trephined at site of scar. Dura mater tense. No pulsation. Nothing pathological between bone and dura, no injury to bone. On opening dura marked injection of the superficial vessels of the brain. A puncture of the brain in various directions showed nothing. Dressing applied. Patient died on Dec. 6th. At post-mortem examination in addition to other conditions there was found in the left frontal lobe, principally under the first orbital convolution a point of softening the size of a walnut. The softening of the brain substance had evidently been caused by the dark red blood clot which was found at this point.

CASE 20. Duret. Semaine méd. Par., vol. ii, p. 119, 1891. Butcher was thrown from wagon to the ground, he was able to get back to his feet and continue his pursuit, but suffered pain in left parieto-occipital region. On 15th day headache became very intense and produced a complete aphasia. Consciousness not impaired. Motor aphasia complete. Trepanation revealed a clot beneath the dura mater. Removed about two teaspoonfuls of blackish fluid. Could say yes and no on fourth day, continued to improve, dismissed entirely restored. Unfortunately on 23d day, after copious libations, he was attacked with severe cerebral congestion and died in convulsions.

CASE 21. Starr. Brain Surgery, p. 107. Patient, age 26, since injured with penknife unable to find words. After fourteen days disturbance of speech increases, and the pains in wound increase. Trepanation. Knife had penetrated dura and brain; dural wound was enlarged and black blood detritus removed. Rapid improvement. Complete recovery.

CASE 22. Hulke. Seydl. Antisept. und Trepanat., p. 48. Case of trauma; transitory unconsciousness; worked for two days. During course of fourteen days dizziness and impaired speech developed; a few days later unconsciousness and paralysis of right extremities, abolition of reflexes; in a few days more spastic rigidity and convulsions of left arm. Trepanation. Incision on right side; discharge of brownish red fluid; one hour later consciousness returned. Went back to work in eight weeks. Case of collateral hemiplegia with operation on same side.

CASE 23. Ceci. 1887. Schædeltrepanation be, Hemiplegie und Koma. Deutsche Med. Ztg., vol. viiii No. 40, p. 459. Injury to right upper parietal region. Paraplegia followed two months later, and then complete left sided hemiplegia; deviation of tongue to right side ten days later, disturbance of speech, involuntary micturition, coma. Probable diagnosis, cerebral abscess. Trepanation. Revealed free extravasate of blood under dura mater; puncture of brain substance failed to reveal abscess. Gradual complete recovery.

CASE 24. Fletcher. 1896. Peoria Medical Record, vol. i, p. 248. Patient fell seven feet striking back of head, unconscious for one hour, slight bruise over center of occipitoparietal suture of left side. Recovered sufficiently to eat his breakfast and go to work. Had some delusions of sight which increased until he gave up his situation and retired to his farm. In six months memory greatly impaired as to locality; visual delusions, stupor, coma with respirations at five per minute and indications of immediate death. Trephined over seat of injury, dura bulging through the opening, divided the dura, about one ounce of bloody serum escaped followed by immediate relief, respirations, pulse, and temperature becoming normal. The patient sat up next day and has continued in good health since, now four years.

CASE 25. Guerry. 1906. Jour. South Carolina Medical Association, vol. ii, p. 328. Patient was struck with knife blade over the left Rolandic fissure. Blade removed at once and no symptoms beyond a transient hebetude. Went to work next day. Twenty-one days after receipt of injury he noticed that he was losing use of right arm and leg; four days later profound coma; pulse 40, temperature 98, respirations 10, with complete paralysis of right half of body. At operation a large subdural clot was found over left Rolandic fissure. Recovery slow.

CASE 26. Dawbarn, in discussing Kiliani's paper, Case 8, referred to a case which received a blow on the right side of the head. The following week the patient became somewhat irritable. Later he developed a partial left hemiplegia and left facial paralysis. Patient continually placed hand over right side of head to indicate where struck. Trephined on right side but nothing was found. Patient died two days later. Autopsy revealed large blood clot over left motor area on side

paralyzed, between the dura and the skull. Hæmorrhage was apparently the result of contrecoup. The brain and medulla were submitted to Dr. Gray, who reported it was one of the rare cases where the motor fibres had not crossed but gone down straight, each on its own side of the medulla and cord.

CASE 27. Boyd. Clinical Societies Transactions, London, vol. xxv, p. 157. Male. Age 40 years. Fell from horse March 31, 1901. Stunned and carried home in a cart. On reaching home, twenty minutes later, was conscious and walked upstairs. Diffuse swelling over left side of head and forehead. Was kept in bed for a fortnight, complaining chiefly of headache. Returned to business April 21st. On June 18th, his headaches returned and he noticed difficulty in writing and could not carve or button his coat. With his eyes closed he was inclined to walk to the right. From time of injury had loss of sense of smell. On June 22d patient was confused and dull. No tender spots on head. The movements of the right arm could be performed but were weak. Tactile sense normal. Walked fairly but could not go upstairs well with right leg. Increased knee jerk on right side. Sight good. Disc normal. Pupil symmetrical, react to light and accommodation. Cranial nerves normal. June 25, right arm almost completely paralyzed. Right leg weak. Some rigidity of right arm and leg. Right eye congested, pupil contracted, and lid drops. Patient now had pain over left parietal region, increased by pressure. By June 28th, patient had become comatose and the leg was completely paralyzed. Trephined on the left side over the middle of the fissure of Rolando. There was a possible linear fracture, but this was uncertain. Dura bulged markedly. No pulsation. On incising dura a grayish yellow surface was exposed. It was supposed to be the brain surface with pus beneath it. On incising this 4 ounces of dark red clear fluid escaped. (The collection was called a cystic clot. It seems probable that a layer of plastic lymph had been incised instead of the brain surface.) A drainage tube was placed in the cavity. At 11 P. M. patient said, "Good evening, Doctor," and immediately became again unconscious. During the night he roused up and talked incessantly. June 29th. Patient improved. Could move both arms and legs. By July 8th patient said he felt well. He was up July 29th. On Aug. 15th was seen by doctor. On Aug. 27th he seemed to be entirely recovered.

BLOOD CYST

CASE 28. Taylor and Ballance. London Lancet, 1903, vol. ii, p. 597. Male. Age 34 years. In Feb., 1902, fell striking right side of head against a stone. He returned home and was unable to work that day. Some three months after patient suffered from headache. Headaches gradually grew worse and by July 10th patient had difficulty in walking and was becoming dull mentally. At this time there was marked weakness in left arm and leg. Pain continued in head. At this time some blurring in right optic disc was noticed. Admitted to hospital and remained a month. At that time was considered insane. Returned in August and the presence of optic neuritis led to a diagnosis of tumor of brain, the variable character of the paralysis of the left arms suggesting a fluid tumor, possibly an abscess. He was admitted to hospital Aug. 20, 1902. His general health was much deteriorated, loss of memory for recent events and gait irregular and swaying. Deep reflexes were exaggerated on the left side. Optic neuritis with retinal hæmorrhage existed on the right side. Headaches were intermittent. Diagnosis, cerebral tumor in the right frontal region. Operations were in three stages, Sept. 1st, Sept. 6th, and Sept. 18th. At the latter operation there was a temporary ligature of the internal carotid artery. A bone flap 5½ inches anteroposteriorly by 4½ vertically which had previously been made was turned back. A cystic tumor lying behind the dura but not adherent to the brain was removed. It was not connected with any main vessels. The cyst on removal measured 7 inches in length, 4½ from above downward, and 1½ in thickness. The bone flap was replaced and sutured. The patient was discharged Jan. 15, 1902. He seemed to be in perfect health on May 26th.

HÆMORRHAGIC UTERI; MYOPATHIC UTERINE HÆMORRHAGE

By BROOKE M. ANSPACH, M.D., Philadelphia, Pennsylvania

OCCASIONALLY, in the practice of gynecology, cases are met which have persistent menstrual or intermenstrual hæmorrhage as the most prominent symptom and yet exhibit none of the lesions commonly producing either menorrhagia or metrorrhagia.

Addinsell[1] introduces a recent article with the following remarks: "There occur from time to time cases of inter-menstrual bleeding, at first slight in amount, but gradually increasing, which call the attention of the patient to the fact that all is not right. The periods increase in frequency and in amount. They last longer, are more severe, and there are often inter-menstrual hæmorrhages. In severe cases, the bleeding may be almost constant, with the intervals of freedom shorter than the periods of bleeding. Examination reveals nothing abnormal, the ovaries and tubes are felt to be free from any gross lesion, the uterus is perfectly movable, perhaps slightly enlarged, but not markedly so."

Although Addinsell was writing under the title of "Chronic Infective Metritis," it is needless to point out that a small intramural fibroid, or an early cancer of the fundus, might present the symptoms which he has portrayed. If after a very careful examination both could be excluded and if none of the general causes of persistent hæmorrhage could be found, a logical conclusion would be that either the endometrium or the myometrium was at fault.

THE ENDOMETRIUM

Galibin,[2] as long ago as 1887, remarked that the prominent indication of fungoid or villous endometritis was hæmorrhage, and Robertson[3] believes that it is quite a constant symptom.

Unquestionably a fungus overgrowth of the endometrium may produce persistent hæmorrhage at the close of the child-bearing process. In most cases, the entire endometrium is hypertrophied, the stroma is condensed, the glands are increased in number, and many of them are cystic. The clinical symptoms and the large quantity of tissue removed by the curette frequently suggest cancer. A large majority are cured by a thorough curettement. Six uncomplicated cases at the University, three at the Kensington Hospital, and two outside cases of which I have notes, were entirely relieved, one of them subsequently bearing a child. Kubo had a large percentage of cures following curettement for hæmorrhage in polypoid endometritis, and Donald[1] reported seven cases of hæmorrhage due to chronic endometritis in virgins, all of which were cured by curettage. When the endometrium is normal or when its removal does not affect the symptoms, attention naturally must be directed toward the myometrium.

THE MYOMETRIUM

What changes in the uterine wall are responsible for persistent menorrhagia or metrorrhagia?

The question has been answered variously by different authors. Cruveilhier gave the name of *apoplexia uteri* to certain cases of metrorrhagia, apparently due to the rupture of sclerosed blood-vessels in the uterine mucosa and inner wall. This title was adopted and the morbid anatomy was elaborated by von Kahlden, Herxheimer and others. A second group of observers, in which Theilhaber[2] is prominent, attributes myopathic hæmorrhage to an increase of the connective tissue of the uterus at the expense of the muscle, and calls the condition myo-fibrosis of the uterus or chronic metritis.

[1] Addinsell, Augustus W. "Chronic Infective Metritis." Jour. Obst. & Gyn. British Empire, vol. x, July, 1906, No. 1, p. 6.

[2] Galibin, A. L. "Dis. of Women." London, Churchill, 1887, p. 215.

[3] Robertson, Chas. A. "Endometritis: Its Pathology and Treatment." Amer. Jour. Surgery and Gyn., xviii, 1905, No. 6, p. 103.

[1] Donald, Archibald. "Chronic Endometritis and Chronic Metritis in Virgins." Jour. Obstet. and Gynec. British Empire, vol. v, 1904, p. 232.
Donald, A. "Chronic Endometritis and Chronic Metritis in Virgins." Studies in Chronic Metritis and Chronic Endometritis, Donald & Shaw, Sherratt & Hughes, London and Manchester, 1907.

[2] Theilhaber, A. Zu Lehre von der Entstehung der Uterusblutungen." Munch. med. Woch., 52, 26, 1249.
Theilhaber, A. "Die sogenannte chronische Metritis, ihre Ursachen und ihre Symptome." Archiv. f. Gyn., bd. 7, 1903, p. 411.

ANTERIOSCLEROSIS

How often is arteriosclerosis responsible for uterine hæmorrhage? Few of the modern writers regard sclerosis of the uterine vessels as more than a predisposing cause of hæmorrhage, and the old term "apoplexia uteri," which carried with it the conception of a rupture of diseased arteries has been discredited. Von Kahlden's cases had no clinical importance; there had been no metrorrhagia during life, the patients were all advanced in years, and most of them died from pulmonary or cardiac disease. The writings of Herxheimer [1] and Popoff [2] in connection with "apoplexia uteri" were misinterpreted. Their cases were instances of serious visceral disease in which at post-mortem infarcts of the uterus were found.

The actual significance of "apoplexia uteri" was indicated by an article of Simmonds [3] who stated that it was very frequently found in the post-mortem section of old women. The hæmorrhagic infiltration affected the endometrium and the underlying muscle. There was high-grade sclerosis of the arteries, with thickening of the intima, calcification of the media, and narrowing of the vessel lumen. The bleeding occurred shortly before death, when the force of the heart was diminished, and was caused by narrowness and rigidity of the vessels. It must be regarded, he said, as a preagonic, clinically unimportant process.

The frequency with which marked arteriosclerosis of the uterus has been found in old women is quite noticeable. Meinecke [4] met with it so often that he did not consider it important; Grube [5] demonstrated high-grade sclerosis in 13 multiparous uteri which had been *removed for various reasons*, and Kon [6] and Karaki noted that in advanced age, almost without any exception, calcareous deposits were found in the uterine blood-vessels.

The question naturally arises, whether arteriosclerosis of the uterine vessels, which is so frequent, produces intractable hæmorrhage? Findley [1] believed that there was a normal obliterative arteritis which was distinct from the arteriosclerosis reported by different authors as causing hæmorrhage; in the first, the intima was involved, while in the second, the changes were confined to the media and the adventitia. Salowij [2] also divided arteriosclerosis of the uterine vessels into two forms — the non-senile, which particularly interested the clinician, being marked by symptoms of chronic endometritis, and the senile, which was very rarely discovered during life, and as a rule, caused no symptoms.

If the histological studies of Reinecke,[3] who was one of the first to ascribe uncontrollable hæmorrhage to arteriosclerosis of the uterine vessels, are compared with the description of von Kahlden,[4] whose cases must have been senile, it will be seen that the conditions are identical; and both are like the hypermyotrophy of the coronary arteries of the heart, described by Saville [5] and the alterations in the vessels

[1] Herxheimer, Karl. (Echter hæmorrhagischer Infarct im Gebiete der weiblichen Beckenorgane, Virchow's Archiv., bd. civ., 1886, p. 20.) Herxheimer's cases were post-mortem ones; there were emboli of the right hypogastric artery and of the chief branch of the left. Also gangrene of the vagina, portio, cervix, lower part of rectum, bladder and perineum.

[2] Popoff's (Popoff, D. "Zur Kenntniss des Hæmorrhagischen Infarktes des Uterus." Archiv. f. Gynak., bd. 47, 1894, p. 12) cases were associated with cerebral hæmorrhage and embolism, myocarditis, infarcts in both lungs, chronic nephritis. There were two cases like Herxheimer's of thrombi in both uterine arteries with infarction of the cervix, not of the body of the uterus, as there is a good collateral circulation with the ovarian vessels.

[3] Simmonds. "Uber Hæmorrhagien des Endometriums bei Sklerose der Uterin-arterien." Cent. f. Gynäk., 1901, S. 81.

[4] Meinecke. Mittheil aus Aerztl. verein zu Hamburg. Monats f. Geb. u. Gynäk., bd. xi., 1900, p. 607.

[5] Grube. "Uber unstillbare Blutungen aus dem Uterus und Arterio Sclerosis Uteri mit mikroskopischen Demonstrationen." Cent. f. Gynäk., 26, 1902, p. 673.

[6] Kon, J., and Karaki, Y. Virchow's Archiv., bd. 191, h. 3.

[1] Findley, Palmer. "Arteriosclerosis of the Uterus as a Causal Factor in Uterine Hæmorrhage." Amer. Jour. Obstet., vol. lii, 1905, p. 71.
Findley, Palmer. "Arteriosclerosis of the Uterus." Amer. Jour. Obstet., vol. xliii, 1901, p. 30.

[2] Salowij, A. "Die Sklerose der Arterien der Gebärmutter als Ursache von unstillbaren Blutungen. Monats. f. G. u. G., bd. 25, 1907, S. 291.

[3] Reinecke, Ernst Alexander ("Die Sklerose der Uterinarterien und die Klimakterischen Blutungen." Archiv. f. Gyn., bd. 53, 1897, p. 340) thinks the essential lesion in these cases is a more or less marked thickening of the muscle layer of the tunica media with which, as a rule, is closely bound a proliferation of the adventitia.

[4] von Kahlden, C. "Ueber die sogenannte Apoplexia Uteri," Beiträge z. Path. Anat., 1898, vol. 23, p. 161–191.
von Kahlden reports eight cases of what he calls "apoplexia uteri," found at post-mortem. In all there was more or less hæmorrhagic infiltration of the mucosa. The uterus was either normal in size, somewhat smaller or somewhat larger. The bleeding was exclusively in the corpus. Great quantities of free blood in the endometrial cavity were not found. The uterine cavity was not always dilated, and in the majority of cases the hæmorrhagic infiltration did not extend beyond the mucosa. In these cases there were characteristic alterations of the vessels of the uterine wall. They consisted of a high-grade narrowing and calcification of the walls of most of the arteries. The intima was transformed into connective tissue which showed granular degeneration, and had an especial affinity for eosin. Whether the muscular wall hypertrophied also, it was difficult to determine, especially when the degeneration of the intima was continuous with that of the intima and media, but in some cases it appeared as if the media had been hypertrophied before degeneration occurred. Hyaline degeneration of the intima and media was less frequent than a granular form. Calcification occurred mostly within the inner two-thirds of the media.

[5] Saville, T. D. "Arterial Hypermyotrophy." Brit. Med. Jour., Sept., 1896, p. 713, vol. ii. Arterial hypermyotrophy probably corresponds to what was formerly described as arteriosclerosis. It consists of an hypertrophy of the middle coat of the artery. It was formerly taken for fibrosis, because prolonged staining was necessary to bring out the rod-shaped nuclei, characteristic of muscle.

of contracted kidney observed by Gull and Sutton.[1]

MYOFIBROSIS OF THE UTERUS AND CHRONIC METRITIS

The lesions which affect particularly the muscle and the fibrous tissue of the myometrium outside the vessel walls have been described as fibrosis of the uterus and as chronic metritis.

Scanzoni,[2] in 1863, called attention to chronic metritis as a cause of hæmorrhage. The histology of chronic metritis, is a subject concerning which there has been a considerable difference of opinion and much confusion. Of the earlier writers, Klob[3] announced that the uterus was enlarged from an increase of the connective tissue, whereas Finn[4] found both the muscle and connective tissue equally hypertrophied. Since their time there has continued to be some disagreement as to the actual anatomical change in the wall of the uterus which characterizes the disease, some authors dwelling upon one feature, some emphasizing another. The consensus of opinion is that there are two forms of chronic metritis; one begins insidiously and is more or less chronic from the first (Martin[5]) being the sequel of chronic pelvic congestion from whatever cause — whether displacement, excessive venery, heart failure, sitting occupations, chronic constipation, or lack of exercise. This form is more or less intimately associated with subinvolution and with congestion and engorgement of the vascular channels of the uterus; it is spoken of by Gardner[1] and Goodall as the arteriosclerotic form of chronic metritis. There may be œdema and hypertrophy of both the muscle and the connective tissue.

In the other variety there is first an acute inflammation of the myometrium with excessive hyperæmia, œdema, and serosanguineous, fibrinous or purulent infiltrate. The uterine muscle is soft and succulent and cuts like a thick steak. On section, the gaping lumen of veins can be seen and the arteries project in little stumps from the surface (Scanzoni). This stage may undergo resolution with no after-change, but if the inflammation has been severe enough to cause destruction of tissue, the destroyed parenchyma is replaced by fibrous tissue which makes the organ tougher than normal, so that it cuts like a hard fibroid. In most cases the acute symptoms disappear and the infectious organisms are destroyed, but the inflammatory exudate is not completely absorbed and remains a source of irritation leading to the growth of cicatricial intermuscular connective tissue which subsequently may undergo hyaline degeneration.

MECHANICS OF UTERINE HÆMORRHAGE IN CHRONIC METRITIS

Theilhaber, who has written extensively on chronic metritis at the time of the menopause, believes the hæmorrhage is produced by a disproportionate increase of the connective tissue and has a very ingenious explanation. A relative connective tissue hyperplasia is physiological in the preclimacteric years and after the climacterium. The uterus does not tend to become larger, but atrophies. It is not hyperæmic but anæmic. Many of the vessels are obliterated and the amount of blood sent to the uterus is diminished. If this narrowing of the vessels for some reason or other does not occur, there is a stasis of the venous blood because of the weakened contractile power of the uterus and menorrhagia or me-

[1] Gull and Sutton ("Arterio-Capillary Fibrosis." A collection of the Published Writings of Sir William Gull, M. D., New Sydenham Soc., 1894, p. 325) in describing their arterio-capillary fibrosis say that the morbid changes in an affected vessel are by no means necessarily uniform throughout its length and may not extend to its ramifications. The lumen of the affected arteriole is sometimes distinctly lessened. The pathological anatomy varies according to the size of the vessel. In the larger ones the three coats being distinct, the intima is sometimes thickened to marked degree. The muscular coat is variously altered, seeming to be relatively increased, but not showing evidence of a muscular hypertrophy. The outer coat of the arteriole, as seen under the microscope, is commonly bound by a few well-defined fibres of white, fibrous tissue, in which and immediately in contact with the muscular area, there is a more or less homogeneous hyaline formation. The morbid appearance described is chiefly seen in the minute arterioles and larger capillaries of the pia mater; it may also be seen in the arterioles of the kidney, skin, stomach, spleen, lungs, heart, and retina. The authors conclude that the arterioles throughout the body, in that condition commonly called Bright's Disease of the kidney, are more or less altered and that this alteration is due to a hyaline fibroid change in the walls of the minute arterioles, and a hyaline granular change in the corresponding capillaries, occurring chiefly outside the muscular layer, but also in the tunica intima. The degree to which the affected vessels are altered and the extent to which the morbid change is diffused over the vascular system of different organs varies much in different cases.

[2] von Scanzoni, F W. "Die chronische Metritis." Wien., 1863, Seidel.

[3] Klob, Julius M. "Path. Anat. of the Female Sexual Organs." Translation, 1861, N. Y.

[4] Finn, N. "Ueber die Veränderungen des Muskel und Bindegewebes bei chronischer Metritis." Centralbl. für medicinischen Wissenschaften. Bd. vi., 1868, S. 564.

[5] Martin, A. Jung. Ph. Path. u. Therap. der Frauenkrankh. vierte. Auflag., Berlin and Wien, 1907, p. 61, and 230–232.

[1] Gardner, Wm. & Goodall, Jas. R. Chronic Metritis and Arteriosclerotic Arteries. Brit. Med. Jour., Nov. 3, '06, p. 1177.

trorrhagia occurs. If the vessels become stenosed in the following years the bleeding may subside spontaneously, the uterus gradually undergoing atrophy. This reasoning is good, but the statement that there is an excessive fibrosis of the myometrium in hæmorrhagic uteri is open to doubt. Thus, Freund[1] after examining 34, and Shaw[2] in a study of 27 specimens could not confirm it.

Theilhaber based his views on the work of Meier, which is unconvincing, because the examinations were made with a few exceptions on autopsy specimens within twelve to twenty-four hours of death and on uteri, the seat of fibroids and cancer.

DEDUCTIONS TO BE DRAWN FROM THE CASES OF HÆMORRHAGIC UTERI REPORTED IN THE LITERATURE

Sixty-two cases of persistent menorrhagia or metrorrhagia attributed to lesions of the myometrium had been reported in the available literature up to October, 1907. An abstract of each case, p. 320, and an analysis of the entire number, p. 334, is appended to this paper

It is at once evident that they have not been reported with uniform accuracy or detail, this author looking at them from one standpoint, that author taking an entirely different point of view.

In many reports the data are meagre, especially in regard to the general health, the menstrual "habit," the previous treatment, the consistency of the uterus, the condition of the adnexa, and the gross and histological examination of the blood-vessels. A large number were complicated by lesions outside the myometrium which might have been responsible for the hæmorrhage, the latter being ascribed to a sclerosis of the myometrium and the blood-vessels, notwithstanding the fact that in many, such complications as fungus endometritis, displacement, fibromyoma, adenomyoma, cancer, pelvic inflammatory disease, or advanced cardiac and renal lesions were know to exist.

A review of 2,500 cases in the gynecological service at the University Hospital showed that menorrhagia or metrorrhagia was a symptom in 49 per cent of fibroids, 20 per cent of retroposition, and 19 per cent of pelvic inflammatory cases. The relatively low percentage of increased flow found in fibroid tumor is evidence that the historians were not over ready to consider menstruation profuse. These figures prove that in a certain proportion of cases of retroposition, descensus and prolapse, pyosalpinx and ovarian abscess, chronic adhesive peritonitis and ovarian cyst, the symptoms include menorrhagia or metrorrhagia. Therefore, whenever these diseases exist, hæmorrhage from the uterus cannot be ascribed without reservation to a lesion in the myometrium.

It is no wonder, therefore, that the arterial changes or the myofibrosis described in such specimens should be looked upon with skepticism when they are charged with the production of hæmorrhage.

DO MINOR OVARIAN CHANGES PRODUCE MENORRHAGIA OR METRORRHAGIA?

Is a small uncomplicated Graafian follicle or corpus luteum cyst ever responsible for persistent metrorrhagia? MacDonald[1] believes that anatomical changes or even impaired function without a demonstrable lesion in the ovary may be the cause of uterine hæmorrhage which is otherwise inexplicable, and Freund holds a similar opinion.

I have analyzed eighteen cases of simple Graafian follicle or corpus luteum cyst of the ovary occurring at the Kensington Hospital. The ovary alone had been removed in each instance, and there was no other disease of the adnexa or pelvic peritoneum. In the histories of seven cases, no especial mention is made of the menstrual flow. In eleven it is mentioned, being spoken of as profuse in eight, normal in two, and scanty in one. Of the eight profuse cases, five were complicated by retroposition of the uterus, with a lacerated cervix in three, a hydrosalpinx in one, and combined cardiac and renal disease in one.

In but two of the eighteen cases was menorrhagia the principal symptom for which the patient sought relief; both were among the five retroposition cases and one of them was affected

[1] Freund, Richard. "Zur Lehre von den Blutgefässen der normalen und kranken Gebärmutter." Jena. Fischer, 1904.

[2] Shaw, Wm. F. "Chronic Metritis: Its Pathology and its Relation to Chronic Endometritis."

[1] MacDonald, Elizabeth H. B. "Intractable Uterine Hæmorrhage and Arteriosclerosis of the Uterine Vessels." Jour. Obstet. and Gyn. of the Brit. Empire, vol. xi, 1907, p. 152.

by heart and kidney lesions as well. In none of the uncomplicated cases (3) was menorrhagia the chief complaint. This seems to indicate that minor ovarian changes and small simple cysts of the ovary are not responsible for profuse menstrual flow or for metrorrhagia. Functional changes independent of anatomical alterations, however, are impossible to estimate.

PERSONAL OBSERVATIONS

During the past four years I have met with 15 cases of intractable uterine hæmorrhage for which hysterectomy was performed.

With the assistance of Dr. Lawrence F. Isman, formerly resident physician at the Kensington Hospital, all of the specimens have been carefully studied and compared with twenty-seven uteri which had been removed for other reasons. The gross and histological anatomy in each case was compared with the age, number of pregnancies, symptoms and complications. Especial attention was paid in the histological examination to arteriosclerosis and to the relative proportion of muscle and fibrous tissue in the myometrium.

A detailed report of the cases with the methods and technique employed will be appended (p. 320). At this point it is sufficient to say that almost without exception, arteriosclerosis and myofibrosis were present in *direct ratio to the parity and age* of the specimens and that a good proportion of the supposed hæmorrhagic uteri, upon analysis were explainable upon another basis. There were four cases which were purely myopathic and in them (p. 320) the only suggestion of a lesion was an apparently lesser degree of arteriosclerosis than might have been expected from the parity of the individual.

A distinct connection was demonstrated between apparent fibrosis of the uterine muscle and the increase of elastic tissue in the adventitia which is a part of arteriosclerosis. I feel certain that had many of the sections reported by others as showing "great increase of the fibrous tissue immediately surrounding the blood-vessels" been stained with Weigert's stain, it would have been found that this hyaline fibrosis was really elastic tissue.

The elastic tissue supporting the muscle bundles of the outer layer of the uterine wall was also hyperplastic directly in proportion to the number of pregnancies and to a less extent — the age.

From the unmistakable office of the elastic tissue in other organs, it is logical to believe that the great increase after labor is a provision of nature to take the place of weakened and overstretched tissue, either in the muscle bundles of the uterus or in the walls of the blood vessels. If the normal hyperplasia of the elastica reinforces the muscular tone of the uterus and the arterial walls, then a deficient proliferation might result in relaxation and hæmorrhage.

CONCLUSIONS

1. The arteriosclerosis to which "apoplexia uteri," "intractable hæmorrhage," etc., have been attributed is nothing more than a normal sclerosis and obliteration of the vascular channels of the uterus occurring in due proportion to the parity and the age of the individual. The uterus, in a way, is different from almost any muscular structure of the body. It is functionally useless until puberty. In the child-bearing woman it becomes one of the most active organs only to again become useless and senile at the relatively early age of the menopause.

Although it is possible for sclerosis to occur too early in the life of the uterus and then be of truly pathological significance, it is a fact that in only two of the cases reported in the literature or collected by myself, have the uterine arteries been calcified in a woman who had not passed the menopause, and in the two exceptions the patient had reached the age when the change of life usually occurs.

2. Myofibrosis occurs normally in direct proportion to the parity and age of an individual. The normal atrophy of the uterus which begins about the time of the menopause affects the muscle a little more than it does the connective tissue, but this plays no part in the production of hæmorrhage. Von Kahlden said of the senile uteri he described, "The most frequent alteration was a more or less widespread proliferation of the connective tissue taking the place of atrophied muscle."

3. There are two forms of chronic metritis. The first is an actual fibrosis of the myome-

trium, and follows an acute metritis which has been severe enough to destroy some of the muscle tissue. This form of chronic metritis is complicated, as a rule, by adnexal disease, so that the symptoms, whatever they may be, are not referable entirely to the uterus. The second form of chronic metritis is more or less chronic from the beginning. It is closely connected with subacute infectious metritis, subinvolution of the uterus and pelvic congestion. The wall of the uterus, including both the muscle and the connective tissue, is hypertrophied and œdematous; and the sclerotic changes in the vessels may appear more marked than ordinary — but the symptoms are due to the associated displacement, insufficient heart, fungus endometritis, hypertrophied cervix or adnexal lesions.

4. Napier,[1] as long ago as 1897, observed that cardiac disease favored climacteric hæmorrhage, and there is no doubt that a weak or an insufficient heart is frequently responsible for pelvic congestion with consequent menorrhagia or metrorrhagia. It is only reasonable to suppose that an increase of blood pressure in the pelvic vessels from general arteriosclerosis, cirrhosis of the liver or contracted kidney, would have the same effect.

5. Hæmorrhage purely the result of myometrial disease may be due to an absence of the normal increase of elastic and fibrous tissue, or in other words, to a lack of the physiologic sclerosis of the vascular system and fibrosis of the uterus during the later generative period, resulting in engorgement and congestion of the uterine vessels. The truth of this statement can be proved only by further study.

6. In a large proportion of so-called hæmorrhagic uteri the symptoms are not dependent upon any histologic alteration in the myometrium, but arise from fungus endometritis, hypertrophied and cystic cervix, displacement of the uterus, inflammmatory lesions of the adnexa or the cellular tissue of the pelvis, or congestion of the pelvic bloodvessels from general weakness, cardiac or renal disease.

[1] Napier, A. D. Leith. "The Menopause and Its Disorders." London, 1897.

APPENDIX

Cases Illustrating Clinical Types of Hæmorrhagic Uteri. With Report of the Examination of the Specimen

The following case (one of 4), will serve to illustrate the type of hæmorrhage for which no anatomical or general cause could be found outside of the myometrium.

G. 1583, P. 1109, vol. 32. L. O. Aged 50. Admitted 8/25/'05. Married 27 years. Four children; no miscarriages; labors, non-instrumental. Menstrual flow began at 14. Leucorrhœa, slight; chief complaint, almost constant flow for past nine to ten months; sometimes slight; sometimes profuse. Feels weak from loss of blood. No other symptoms subjectively. Physical examination negative. *Gynecologic examination.* Outlet multiparous; uterus enlarged; freely movable. Adnexa normal. Operation, panhysterectomy. *Specimen.* Uterus 10 cm. long, 7 cm. wide at fundus, 5½ cm. ant. post. diameter. No adhesions. Uterine wall 28 mm. thick. Right tube 7 cm. long. Ostium open. No adhesions. Right ovary 4 x 2 x 1.

The history of a case in which the hæmorrhage was evidently due to disease of the myometrium, but possibly in part attributable also to a displacement of the uterus and chronic metritis, is as follows:

M. K. Aged 30. Admitted 3/16/'06. P. 1244, G. 1759, vol. 36. Patient has been married 14 years. She has had 5 children and one miscarriage. The first labor was difficult; the second and third were normal; the fourth was complicated by placenta prævia, but she went to term; the fifth, two years ago, marked the start of her present trouble. The menstrual flow began at the age of 16; it was regular until the birth of the last child and normal in quantity. The first period after the birth of the last child was normal; at the next one, she bled so profusely, that tamponade of the vagina was required. She also suffered with a bearing down feeling in the lower abdomen. The menorrhagia recurred monthly until June, '05. Then she had D. & C. and repair of cervix and perineum. This was done for a deep unilateral laceration of cervix and a relaxed pelvic floor with retroposition of the uterus. No cœliotomy was permitted. The pain disappeared after the operation, but the menstrual periods, although regular, became more and more profuse; so excessive, indeed, that she was confined to bed for ten days every month and changed her napkins 6 to 10 times daily. The duration of the periods increased, and she sometimes passed clots, and had cramp-like pains. At the time of admission there was considerable anæmia. Hæmoglobin, 80 per cent. Physical examination otherwise negative. *Gynecologic examination.* The uterus is symmetrically enlarged, softened, and in retroposition. The adnexa are normal. Hysterectomy. *Patholog. report.* The uterus is 10.5

cm. long. There are no adhesions. At the fundus it has a width 7 cm. and an ant. post. diameter of 5.75. The wall at the fundus is 2.85 cm. thick. The endometrical cavity is 9 cm. long. There is no sclerosis of the uterine vessels. The uterus is very soft and flabby. The right tube is 10 cm. long. Right ovary, 3½ x 1½ cm. x 9 mm. Left tube, 10 cm. long. Ovary 3 x 1½ x 1 cm. No adhesions nor other abnormalities of either tubes or ovaries.

A typical case of hæmorrhage associated with marked arteriosclerosis of the uterine vessels, but complicated also by an hypertrophied lacerated cervix and retroposition is found in the following:

M. C. Aged 55. Married. The family history is negative. Menstruation was established in her 13th year. At that time it was regular, free, and not painful. Has been married 35 years. Had 13 children and 2 miscarriages; both of the latter were due to traumatism or excessive work. The first two labors were difficult; the last eleven were normal. She never had puerperal fever. The menopause occurred in 1903. In July, 1905, patient strained herself by lifting, and complained of a bearing-down sensation. Examination at that time found the uterus small and anteposed, a bilateral laceration of the cervix and a rectocele. In August, she had a bloody discharge for a few days. Suffered for more than a year with a profuse, watery, vaginal discharge, blood tinged with a rather bad odor and accompanied by severe pruritus. Physical examination of the heart shows first sound very weak, and lacking in muscular tone. The circulation is very poor; the hands, lips, nose, and extremities are blue and cold. The urine at times contains traces of albumin; no sugar, no casts; hæmoglobin, 80 per cent. R. B. C., 4,250,000; W. B. C., 6,000. The hæmorrhage continued with loss of flesh and pain in the lower part of back extending down the left leg. Hysterectomy, November, '06. *Path. report.* The uterus and adnexa are free of adhesions. The uterine cavity is 6 cm. long. There are well-marked and prominent vessels projecting from the cut surface of the uterine wall. The uterine artery on the right side is sclerotic. The right tube is 5 cm. long and normal. The right ovary measures 3 x 2 x ½ cm.; no abnormalities. The left tube, 5 cm. in length, entirely normal. Left ovary, 3 x 2 x ½ cm., normal.

The part which chronic heart disease and varicosed broad ligament vessels may play, is shown by case:

E. Mc. P. 897, K. H., 5630. Aged 52. Married. Menstruation began at the age of 14; duration was 7 to 8 days. The flow was free. Patient had 6 pregnancies; no miscarriages. Began to bleed 7 years ago, her periods lasting three weeks. At intervals since that time she has had severe attacks of bleeding. Physical examination shows *marked* mitral regurgitation. The apex is best heard one inch below and to the left of the nipple. Hysterectomy. *Specimen* consists of the uterus and appendages. The surface is free of adhesions. The anterior uterine wall is 2¾ cm. thick. Both tubes and ovaries appear entirely normal. Right tube 9 cm. long; right ovary measures 3½ x 2 x 1½ cm. Left tube 9 cm. long; left ovary measures 3 x 2 x ½ cm., and contains an unruptured Graafian follicle. The vessels of the broad ligament are dilated markedly, engorged and tortuous. A number of vessels project from the cut surface of the uterine muscle. The remains of the endometrium are atrophic.

Details of Sixty-two Cases Reported in the Literature with Critical Observation of each Case

Von Lorentz [1]

Case 1. Age 46 years. Married. Three abortions. Severe hæmorrhage for three months at menstrual periods; duration 8 days. No previous operation. Menorrhagia; profuse leucorrhœa. Menstruation formerly regular; 5 days duration. Operation, total hysterectomy. No data in regard to general condition. Uterus 14 x 11 x 5 cm. Fundus contains interstitial myoma size of cherry seed; consistency, hard, tough, and white. Mucosa thickened, uneven in spots, very red. Mucosa of cervix, normal. Uterine mucosa: glands increased, lengthened, and dilated; 3 mm. thick. Nothing said about the vessels grossly, nor about the adnexa. Fibrous tissue increased; proportion 45 per cent. Musculature diminished; 55 per cent.[2] Vessel walls in some places very much thickened.

Nothing is said of the general condition. Interstitial myoma or thickened mucosa may have caused the hæmorrhage. Short duration of symptoms.

Case 2. Age 45. Married. Ten children, last seven years of age; miscarriage, n. s.[3] Duration one year. Previous operations, n. s. Menstrual periods irregular for one year. Amenorrhœa for 3 months; periods occurred once at an interval of 14 days. Last period 4 weeks. Leucorrhœa, n. s. Menstruation previously, three or four days, profuse. Operation, n. s. General condition, n. s. Uterus the size of an ostrich egg. Weighs 250 grams; consistency, n. s. Cervix thickened and knobby. Mucosa .8–1.2 mm. thick. Glands increased, lengthened, corkscrew-like. Vessels grossly, n. s. Adnexa not palpable. Fibrous tissue increased, p. 60 per cent. Musculature spun through with connective tissue; p. 40 per cent.

Incomplete report concerning general condition, adnexa, type of operation and vessels.

Case 3. Age 36. Married or single, n. s.; children, n. s.; miscarriages, n. s.; duration, n. s. Previous operations, three times curetted without results.

[1] Von Lorentz, G. "Beitrag zur pathologic Anatomie der chronischer Metritis." Arch. f. Gyn., 70, 1903, p. 309.

[2] Proportion.

[3] N. S.—Nothing said.

Metrorrhagia. Leucorrhœa, n. s. Menstruation before n. s. Operation, total extirpation. Further remarks as follows: fibrous tissue rich, irregularly distributed; p. 45. Diminished muscle; p. 55. Walls of the vessels greatly thickened.

Incomplete information as to pregnancies, general condition.

CASE 4. Age 30. Married; two abortions; severe hæmorrhage at second labor. Duration, since last abortion. Three times curetted. Menorrhagia. Leucorrhœa, n. s. Menstruation before regular, 5 to 6 days. General condition, n. s. Operation, total extirpation. Uterus 15 cm. long and 3 cm. thick. Consistency, n. s. Endometrium .8–1.10 mm. thick. Glands increased. Vessels and adnexa, n. s. Fibrous tissue increased; p. 50. Musculature small and spun through with rich connective tissue fibres. Vessels, n. s.

What about the general condition, the adnexa and the position of the uterus?

How long have symptoms lasted? Was subinvolution the cause of the hæmorrhage?

CASE 5. Age 39. Married. Three children, last 7 years of age. Duration one year. One curettement without result. Menstruation always every four weeks, lasting 5 to 6 days, profuse and painful. General condition, n. s. Uterus the size of a man's fist. Consistency, strikingly soft and œdematous. Endometrium 1.5 mm. Glands of mucosa numerous. Patient did not complain of hæmorrhage, but of severe dysmenorrhœa and constant backache. Vessels grossly, and adnexa, n. s. Fibrous tissue richly developed; p. 45. Muscle diminished; spun through with connective tissue.

Hæmorrhage not chief complaint.

Nothing said of general condition, adnexa or vessels.

CASE 6. Age 34. Married. Three children: last 4 years ago. Duration, n. s. Two curettages without result. Metrorrhagia. Leucorrhœa, n. s. Menstruation before, n. s. Operation, total extirpation. General condition, n. s. Uterus 11.5 cm. long, 9 cm. wide, and 3¾ thick. Consistency, n. s. Endometrium 1.5 mm. thick. Vessels grossly, and adnexa, n. s. Connective tissue increased; p. 50. Muscle diminished; drawn through with connective tissue; p. 50.

What about general condition, position of uterus, adnexa and vessels?

CASE 7. Age 43. Married. Twelve children; one abortion 1½ years ago. Duration one year. Two curettages; one in April, 1902, and the other in October, 1902. Metrorrhagia. Leucorrhœa, n. s. Menstruation before, regular. Operation, total extirpation two months after last curettage. General condition, n. s. Uterus the size of a man's fist; in retroflexion. The wall 2½ to 3 cm. Uterine cavity large and wide. Mucosa 4½ to 6 mm. Large quantities of the mucosa run deep into the wall. Vessels, n. s. Adnexa size of hazelnut. Fibrous tissue increased; p. 45. Muscle field small; p. 55. Vessel walls not thickened.

Nothing about the general condition. Malposition of uterus and adenomyoma.

CASE 8. Age 32. Married. No children. Miscarriages, n. s. Duration recent, otherwise, n. s. Previous operation, n. s. Menorrhagia; leucorrhœa variable. Menstruation previously moderate, regular, six days' duration; severe pain. General condition, n. s. Bad type of chronic metritis; adnexal disease. Uterus only slightly enlarged, 10 cm. wide by 3 cm. thick. Consistency, n. s. Mucosa, 1.6 mm. Glands increased. Contains a small myoma. Vessels grossly, n. s. Adnexa "diseased." Connective tissue richly developed; p. 50. Musculature diminished; p. 50. Walls of vessels not thickened.

Diseased adnexa — myoma.

CASE 9. Age 38. Married. Three labors, last 14 years ago. Duration 8 years. Previous operation, n. s. Metrorrhagia for last half year. Leucorrhœa, n. s. Operations , n. s. Menstruation at first every 4 weeks, 8 to 10 days. For last eight years hæmorrhage has increased in amount. The uterus shows considerable hypertrophy of its wall; carcinoma of the cervix. Consistency, n. s. Endometrium, 1.4 to 2 mm. thick. Vessels grossly, n. s. Adnexa, n. s. Fibrous tissue greatly increased; p. 55. Muscle field small; p. 25. Some of the vessels show great thickening of the walls.

Hæmorrhage explained by the carcinoma of the cervix.

The fibroid, adenomyoma, and cancer cases are inadmissible. In two cases it is a question whether hæmorrhage was marked. There is very little difference in the proportion of fibrous and muscle tissue found in these cases and the normal parous uterus, (fibrous 46.5, muscle 53.5 (Meier), according to Shaw).

SWITALSKI — 1895

CASE 10. Age 29. Married 13 years. One child 10 years ago; one miscarriage 12 years ago. Duration, since 6/12/'94. Previous operation, curettage in August. Metrorrhagia and leucorrhœa, n. s. Operation, total vaginal hysterectomy in December. Menstruation before regular, but free. General condition, n. s. On account of parametritis following one curettement and another digital examination of uterine cavity, hysterectomy was difficult and morcellement was required. Author says uterus grossly was entirely normal, and on microscopic examination in the laboratory nothing was found but a mild, interstitial endometritis.

Nothing is said of the general condition. Uterus adherent. Specimen removed by mor-

cellement difficult to study and accept as a basis for conclusions.

McDONALD — 1907

CASE 11. Age 36. Married 18 years. Four children; five miscarriages. Five years' duration. Nothing said about previous operations, menorrhagia, or leucorrhœa. Dysmenorrhœa. Hysterectomy, December, 1905. Menstruation before, painful, but regular for five years secondary to infective endometritis. Uterus 10½ x 5 x 5 cm. Anterior wall 2½ cm. thick. Consistency, n. s. Endometrium thickened, 10 mm. Glandular endometritis. Some glands cystic. Vessels grossly, n. s. Adnexa, n. s. Fibrous tissue increased in areas of perivascular degeneration. Muscle and fibrous tissue equal in amount. Muscle œdematous. Nuclei swollen. Thickening of large arteries. Lumen irregular from projection of media and occasionally of intima. Marked periarterial and perivenous degeneration. The muscle hypertrophy may be a work hypertrophy due to the thickening of the mucosa.

Were not the symptoms due to endometritis? Hypertrophy of muscle!

CASE 12. Age 51. Married. Seven children; no miscarriages. Duration of symptoms, previous operations, and menorrhagia, n. s. Leucorrhœa for 2 years; recently bloody. Abdominal hysterectomy 5/18/'06. Menstruation regular to menopause at 47. Mitral regurgitation; alcoholism. Uterus 6 x 3¼ x 2¾ cm. Anterior wall 1½ cm. thick. Consistency firm. Mucosa atrophic and hæmorrhagic. Vessels thick and prominent in the parametrium. On section stand out from uterine wall. Adnexa on left side adherent. Carcinoma of sigmoid. Fibrous tissue increased. Muscle bundles separated by bands of fibrous tissue. Degeneration and atrophy of muscle cells. Marked perivenous, periarterial, and intramural degeneration of vessels. Calcification of the larger arteries. Calcification of a branch of the ovarian artery in the broad ligament.

Adherent adnexa. Cancer of sigmoid. Mitral regurgitation.

CASE 13. Age 50. Single. No children; one miscarriage 20 years ago. Duration of symptoms 3 years. Curettage 2½ years ago. Metrorrhagia. Leucorrhœa, n. s. Vaginal hysterectomy in May, 1906. Menstruation regular until 3 years ago. Heart and kidney insufficiency; fatty liver. Aortic stenosis and regurgitation. Uterus 9½ x 5½ x 4½ cm. Anterior wall 2½ cm. Cervix in part cystic. Consistency normal, but very pale. Mucosa 1-2 mm. thick. Endometrium uniformly smooth and pale. Mild glandular endometritis. A few hyaline vessels. Vessels grossly appear projecting from the surface of the uterine wall. Left ovary cystic. Right ovary normal. Left tube, hydrosalpinx size of banana. Slight increase of fibrous tissue; tendency to degeneration. Muscular tissue well preserved. Vessels, hypertrophy of media without degeneration. No typical periarterial or perivenous degeneration.

Serious heart lesion; kidney insufficiency; fatty liver.

CASE 14. Age 45. Post-mortem case. Death from peritonitis, the result of septic endometritis. Curettage 3 months before death. Menorrhagia for 10 years. Fibrous tissue well preserved. Muscle bands separated by fibrous tissue. Vessels, marked perivenous, periarterial, and intramural degeneration.

Should not be considered as it is too incompletely reported.

FINDLEY—1901

CASE 15. Age 70. Duration 14 days. Metrorrhagia. Nothing said about social condition, children, miscarriages, previous operations, and leucorrhœa. At post-mortem there was found endocarditis, dilatation of both ventricles, nutmeg liver, and hæmorrhagic infarction of lung. General arteriosclerosis. Uterus 8¾ x 5 x 4½ cm. Wall 2 cm. thick. Consistency, "thick and firm." Both uterine and ovarian arteries calcareous. Vessels stand out prominently from the cut surface of the uterus. Adnexa normal. Endometrium diffuse and of dark red color. Elastic tissue, n. s. Fibrous tissue in excess. Muscular tissue atrophied. Vessels show thickening of media, adventitia, and intima. There were calcareous deposits in the vessels of the fundus.

General condition to account for hæmorrhage. Post-mortem case. Duration but 14 days; hæmorrhagic infarcts of lung.

FINDLEY — 1905

CASE 16. Age 38. Married. Children, n. s., miscarriage, n. s. Duration 6 months. Previous operation myomectomy in 1903 for five subperitoneal fibroids. Amputation of cervix in 1903. Three curettements in last 6 months. Metrorrhagia. Leucorrhœa, n. s. Vaginal hysterectomy in 1905. Menstruation normal until six months before hysterectomy. Probable cause, n. s. Diatheses, n. s. Uterus 9 x 5¼ x 4½ cm. Subserous fibroid the size of a pea. Consistency very firm. Vessels of uterine wall gaping and prominent. Endometrium 1 mm. thick and congested. Adnexa, n. s. Cervical mucosa normal. Fibrous tissue preponderating; muscular tissue diminished. Vessel walls greatly thickened, especially the media, adventitia, rarely the intima. No diminution in the lumen. No calcareous deposit.

Myomatous uterus; scars of previous myomectomies.

CASE 17. This was a case of prolapsed uterus in a woman 64 years of age — 22 years past the menopause. She suffered for 6 years from urination, backache, and leucorrhœa. Vaginal hysterectomy. Uterus 8 x 4½x3 cm., and very firm. Cervix enlarged and os patulous. Atrophic endometrium. Muscle scant. Fibrous tissue hypertrophied. Great hypertrophy of the media, adventitia, and also of the intima, almost obliterating the arteries. Findley believes this obliteration explains why no hæmorrhage occurred in this case.

Not included with 62 hæmorrhage cases for no such symptom was present. Arteriosclerotic changes were present to a marked degree and prolapsus, and yet there was no hæmorrhage.

CASE 18. Age 41. Married. Two children; one miscarriage. Duration two years. Curettement 3 times. Menorrhagia. Leucorrhœa, n. s. Operation, "hysterectomy." Menstruation normal until 2 years ago. Probable cause and diathesis, n. s. Uterus normal in size and outline. Cervix normal. Consistency, unusually firm. Vessels of cut surface prominent. Endometrium, no gross change. Adnexa, n. s. Fibrous tissue increased. Muscular tissue relatively scant. Vessels numerous and thick walled, especially in the outer half of the uterine wall. Thickening confined to media, adventitia; little in the intima.

Nothing said of general condition.

CASE 19. Age 55. Married. Twelve children; two miscarriages. Duration one year. Diagnostic D. & C. previously. Metrorrhagia. Leucorrhœa, n. s. Menstruation regular up to 9 years ago, when patient had menopause. Patient has an incompetent heart and chronic nephritis. Uterine wall "unusually thin." Consistency, soft. Vessels of broad ligament friable. Endometrium, senile. Adnexa, n. s. Fibrous tissue very much increased; stains poorly. Muscular tissue very much decreased. Great thickening of media and adventitia; to a less extent of intima. Calcareous deposits.

Heart disease.

Findley says the condition undoubtedly existed long before the symptoms began. The exciting cause was probably congestion from poor circulation.

CHOLMOGOROFF — 1900

CASE 20. Age 42. Married 23 years; eleven children, the last one in 1895: six miscarriages, last in 1894. Duration from 1895 to 1897. Curettage in March, 1897. No abnormality of the endometrium found. Metrorrhagia. Leucorrhœa. Vaginal hysterectomy in April, 1897. Menstruation regular but free until 1895. Had midwife at all confinements and abortions except the last abortion, when Cholmogoroff removed the retained secundines with his fingers and a curette. The uterus was 8 x 6½ x 4½ cm. Walls 2 cm. thick. Surface shows adhesions. Consistency, n. s. Vessels on section strikingly open. Endometrial glands normal. Capillaries very widely dilated. In small arteries great thickening of intima; the media is also thick. Adnexa, n. s., although adhesions on uterus show remains of a parametritis. Fibrous tissue, n. s. Muscular tissue, n. s. Great thickening of the media and adventitia. There is scarcely any intima except at a very few points where the lumen is narrow. Media shows evidences of degeneration, is pale and granular, and contains a few nuclei. Perivascular connective tissue between bundles of muscle.

Uterine adhesions.

Was there adnexal disease or displacement? Perivascular changes probably an increase of elastica dependent on numerous children and miscarriages.

CASE 21. Age 31. Married 10 years. No children; two miscarriages, the first 1½ mos., and the second 2 mos. Duration 4 years. D. & C. in August, 1897. Nothing found abnormal in the endometrium. Metrorrhagia. Leucorrhœa. Vaginal hysterectomy in September, 1897. Menstruation, n. s. Probable cause, n. s., but probably pelvic inflammatory disease, as there was exudate on the uterus, and a discharge had begun after the last abortion. The uterus was 8½ x 6½ x 4½ cm. Considerable exudate on the cervix. Consistency thick, and creaks on cutting. The vessels stand open. The endometrial glands are few, and the stroma is infiltrated with blood. Adnexa, n. s. Fibrous tissue increased about the vessels. Muscle, n. s. Vessels same as Case 1; especially marked is the connective tissue adjacent to adventitia, extending between, and separating the muscle bundles in this vicinity. No evidence of inflammation.

Inflammatory lesion and possibly displacement.

CASE 22. With cancer of the cervix. Shows similar alterations to Cases 1 and 2. Inadmissible to study as a case of chronic metritis, arteriosclerosis or fibrosis. Not included in summary of 62 cases.

SHAW — 1906

CASE 23. Age 42. Married. Two children, last 9 years ago; one miscarriage. Duration 2½ years. Previous operations, n. s. Periods last 3 weeks. Leucorrhœa. Vaginal hysterectomy, and rt. salpingo-oöphorectomy in 1899. Menstruation, probable cause, and diathesis, n. s. Uterus retroflexed, large, and tender; os patulous. Uterus adherent. Uterine wall 2 mm. Endometrium 3 mm. Glands are enlarged and numerous. Vessels grossly, n. s. Right ovary adherent; left prolapsed. Right tube adherent; left prolapsed. Fibrous tissue, p. 43.85. Muscular tissue, p. 56.15. The vessels are increased in number but below the average in size. One or two have thick walls due to deposit of fibrous tissue.

Adhesions and retroposition.

CASE 24. Age 38. Married; three children. Two miscarriages. Duration 3¼ years. Three curettements, March, July, and Oct., 1902. Metrorrhagia and menorrhagia. Leucorrhœa. Vaginal hysterectomy, March, 1903. Menstruation, probable cause, and diathesis, n. s. Uterus 16 mm. in diameter. Consistency, n. s. Endometrium 2 mm. thick; glands enlarged and more tortuous. Vessels grossly, ovaries, and tubes, n. s. Fibrous tissue, p. 37. Muscular tissue, p. 63. Vessels increased in number; several increased in size and thickness of walls due to deposit of fibrous tissue in middle coat; also thickened int. coat. Several show hyaline and colloid degeneration.

Incomplete report as to general and pelvic condition.

CASE 25. Age 37. Married. Five children; five miscarriages, last 6 months ago. Duration more or less for 10 years, but worse for last 3. Curettement in October, 1904. Metrorrhagia and menorrhagia. Leucorrhœa. Vaginal hysterectomy in November, 1904. Menstruation, probable cause and diathesis, n. s. Cervix torn completely into left fornix. Uterus heavy, slightly enlarged, fairly firm; walls 17 mm. Endometrium variable in thickness, some places to 2 mm.; glands slightly enlarged; great increase in number. Vessels grossly, ovaries and tubes, n. s. Fibrous tissue, p. 41.88; muscular tissue, p. 58.14. The vessels are numerous; the walls are very thick; most of them show hyaline or colloid degeneration.

Was there displacement of uterus and subinvolution? Was there any adnexal affection? What was the general condition?

CASE 26. Age 43. Married. Two children at least (exact number not definite); no miscarriages. Duration since birth of child 4½ years ago. Emmet repair 4 years ago, no curettement. Menorrhagia and metrorrhagia. Leucorrhœa, n. s. Vaginal hysterectomy, February, 1905. Menstruation, probable cause, and diathesis, n. s. Uterus 12.7 x 7.62 x 2.5 cm. Uterus heavy, with tendency to retroversion and subinvolution. Endometrium 2 mm. thick; glands increased in size and rather more numerous. Vessels grossly, ovaries, and tubes, n. s. Fibrous tissue, p. 38.9. Muscular tissue, p. 61.1. Vessels are increased in number but are neither enlarged nor have thick walls.

Retroposition and subinvolution.

CASE 27. Age 40. Married. Three children; one miscarriage. Duration since miscarriage, 9 months. Curetted September, 1904. Metrorrhagia and menorrhagia. Leucorrhœa, n. s. Vaginal hysterectomy, February, 1905. Menstruation, probable cause, and diathesis, n. s. Cervix torn; os patulous. Uterus enlarged, diameter 24 mm., retroposed, not adherent, but subinvoluted. Endometrial glands increased in number, but small stroma dense. Vessels grossly, n. s. Tubes and ovaries prolapsed. Fibrous tissue, p. 39.9. Muscular tissue, p. 60.1. Vessels greatly increased in number, but they are not enlarged and there is no thickening of the walls.

Retroposition and subinvolution.

CASE 28. Age 54. Married. No children; two miscarriages, last 27 years ago. Curettement 14 and 10 years ago. Metrorrhagia and menorrhagia. Vaginal hysterectomy and right oophorectomy in March, 1904. Leucorrhœa, menstruation, probable cause, and diathesis, n. s. Cervix small; uterus retroflexed, movable; diameter 19 mm. Endometrium thickened, 2 mm.; glands enlarged and more numerous. Consistency, vessels grossly, ovaries, and tubes, n. s. Fibrous tissue, p. 40.55. Muscular tissue, p. 59.45. Vessels are increased in number, but very few are enlarged, and there are no thick walls.

Retroposition. Any disease of adnexa?

CASE 29. Age 36. Married. Ten children; one miscarriage. Duration since miscarriage 16 months ago. Curettement and Emmet's operation in July, 1899. Metrorrhagia and menorrhagia. Vaginal hysterectomy in March, 1899. Leucorrhœa, menstruation, probable cause, and diathesis, n. s. Cervix deeply lacerated. Uterus globular, enlarged, and mobile; diameter 21 mm. Endometrium 2 mm. Glands much enlarged, stroma œdematous, and veins dilated. Consistency and vessels grossly, n. s. Ovaries and tubes normal. Fibrous tissue, p. 41.85; muscular tissue, p. 58.15. Average number and size of vessels. *Large number of spaces; larger than arteries; irregular and oblong in shape; lined with flattened epithelium.*

Are the large spaces glands or dilated veins? Is it adenomyoma or subinvolution? Incompletely reported as to general condition.

CASE 30. Age 30. Single. No children; no miscarriages. Duration 6 years. Curetted three times. Metrorrhagia and menorrhagia. Leucorrhœa, n. s. Vaginal hysterectomy in 1905. Menstruation, probable cause, and diathesis, n. s. Uterus enlarged, in anteflexion, and movable. Endometrium not thickened; glands increased in number and size; stroma dense. Consistency, vessels grossly, ovaries, and tubes, n. s. Fibrous tissue, p. 37. Muscular tissue, p. 63. The arteries are below the average in number and very small. *Numerous spaces lined with a flattened epithelium?*

Incomplete report as to general condition, adnexa, etc. Same queries in regard to spaces as in preceding case.

CASE 31. Age 29. Married; one child; no miscarriages. Two to three years duration. Curettage in September of 1904. Menorrhagia and metrorrhagia. Leucorrhœa copious and white. Vaginal hysterectomy in June of 1905. Menstruation, probable cause, and diathesis, n. s. Uterus 9.52 x 5.08 cm. Walls 2.29 cm. wide. Endometrium. Mucosa considerably thickened; glands numerous but smaller; stroma dense. Consistency, vessels grossly, and tubes, n. s. Left ovary, prolapsed and tender; otherwise, n. s. Elastic tissue, n. s. Fibrous tissue, p. 46.7. Muscular tissue, p. 52.3. The arteries are of average size. *Numerous small spaces lined with a flattened epithelium?*

Thickened endometrium. Incomplete report? Same queries as to spaces as in the preceding reports.

CASE 32. Age 37. Single. No children; no miscarriages. Duration nine months. No previous operation. Menorrhagia and metrorrhagia. Leucorrhœa, n. s. Vaginal hysterectomy in October, 1905. Menstruation, probable cause, and diathesis, n. s. Uterus 7.21 x 4.44 cm. Wall 1.67 cm. in width. The endometrium is thickened, and the glands are enlarged and increased in number. Consistency, vessels grossly, ovaries, tubes, and elastic tissue, n. s. Fibrous tissue, p. 39.05. Muscular tissue, p. 60.95. The vessels are

below the average in number, not increased in size, and the walls are thin.

Thickened endometrium responsible? No report on general condition, adnexa, etc.

GARDNER AND GOODALL — 1906

CASE 33. Age 35. Married 8 years; two children; no miscarriages. Duration 4 years. Previous operation, n. s. Menorrhagia. Leucorrhœa, n. s. Menstruation regular and normal in amount. Vaginal hysterectomy in July, 1906. Probable cause, n. s. Other systems normal. Cervix bulky and cystic; os, transverse laceration and catarrhal; uterus $4\frac{1}{2} \times 3\frac{1}{8} \times 3$ in. Wall $1\frac{1}{2}$ in. Retroversion and retroflexion of uterus; no adhesions. Uterus harder and firmer than normal. Cut surface shows strands of fibrous tissue. Slight glandular endometritis. The vessels do not stand out much. Adnexa are prolapsed but normal. Elastic tissue, n. s. General swelling and hyaline degeneration of the whole fibrous and muscular structure. There is very little alteration in the media. The adventitia takes part in the general fibro-muscular structure. Intima shows nothing more than slight reactionary swelling. No appreciable diminution in the size of the vessels.

Cystic cervix. Retroposition of uterus.

CASE 34. Age 43. Married 22 years; one child seventeen years ago; labor difficult and recovery slow; miscarriage, n. s. Duration 4 years. Curettage and suspension; no improvement after one month. Menorrhagia for 4 years, and metrorrhagia for 15 months. Leucorrhœa, n. s. Menstruation regular, 5 days. Vaginal hysterectomy in April, 1905. Probable cause, n. s. Other systems normal. Uterus $4\frac{1}{2} \times 4 \times 3\frac{1}{8}$ in. Thick wall, $1\frac{3}{8}$ in. In good position; no adhesions save at site of former suspension. Cervix bulky; cut broad ligaments show tortuous hardened vessels standing out prominently. Consistency firm. Mucosa healthy. Vessels in the uterine wall are prominent, and project from cut surface. Appendages free. Elastic tissue, n. s. Marked thickening of the fibrous bands with hyaline ground glass appearance, in which are a few nuclei stained deeply. As in Case 1, the muscle, especially towards the peritoneum shows a peculiar granular deposit with swelling of the cell protoplasm and wide separation of the nuclei. Nuclei vacuolated but normal in staining. The lymph spaces are dilated and epithelium is swollen. The adventitia is thickened, and the media slightly swollen. The intima is intact and normal.

CASE 35. Age 37. Married 10 years. No children; three miscarriages, one 8 years ago at 6 weeks, one 7 years ago at 3 months, and one 6 years ago at $4\frac{1}{2}$ months. Since first miscarriage has had D. & C., trachelorrhaphy, suspension of round ligaments in March, 1904. Improvement until August. Menorrhagia and metrorrhagia. Leucorrhœa, n. s. Menstruation regular and normal until marriage. Total hysterectomy in January, 1906. Probable cause, n. s. Diathesis, n. s. Uterus $4 \times 3 \times 2$ in. Anterior wall 1 in. thick. Uterus retroverted again, fibrous and hard. Mucosa normal; hyaline deposit in med. of small arteries. Marked tortuosity and slight thickening of uterine vessels. On section, vessels prominent. At time of first operation ovaries and tubes free; since then, n. s. Elastic tissue n. s. Large increase in fibrous tissue. In some parts swollen and granular; nuclei widely separated. Muscle fibres swollen; hyaline, fragmented, and atrophic in parts with overgrowth of connective tissue. Adventitia increased; media and intima but slightly affected. The veins are involved in fibrosis. The walls have lost most of the muscle cells, and marked replacement with fibrous tissue results in narrowing and puckering of the lumina.

Retroposition. Nothing said of general condition.

CASE 36. Age 46. Married 25 years; one child 23 years ago; miscarriages, n. s. Duration from July, 1905, to March, 1906. No previous operation. Metrorrhagia and menorrhagia. Leucorrhœa thin. Menstruation normal until July, 1905. Hysterectomy in March, 1906. Probable cause, cardiac irregularity and signs of myocarditis without loss of compensation. Other systems O. K. Uterus enlarged, and retroposed; size, $4\frac{1}{8} \times 3\frac{1}{2} \times 2\frac{3}{4}$ in. thick. Consistency tough. Endometrium thicker than normal; media of arteries thickened and poor in nuclei. The vessels project from the cut surface and are prominent in the broad ligaments. The right ovary had been adherent and was removed with specimen. Tubes, n. s. Elastic tissue, n. s. Fibrous tissue increased, especially in the outer layers; cells swollen; homogeneous with eosin and nuclei few and scattered. The muscular tissue in the inner layer is very much swollen, granular, and homogeneous with eosin. Deep-stained nuclei on ground glass matrix in some parts. The adventitia is markedly involved; strikes one as more of a deposit from passive congestion than a true fibrosis. Media slightly involved; intima not at all. The lymphatics are dilated and lined with swollen cells.

Retroposition. Myocarditis. Diseased ovary.

CASE 37. Age 44. Married 22 years. Four children, last 3 years ago. All labors difficult; miscarriages 2, between labors. Duration 3 years. Previous operation, n. s. Metrorrhagia and menorrhagia. Leucorrhœa and menstruation, n. s. Vaginal hysterectomy in March, 1906; great difficulty with thick, left broad ligament. Diathesis, n. s. The cervix is deeply lacerated, extending into the left broad ligament. This contraction draws the uterus to the left. The cervix is catarrhal and everted. Uterus anteverted and anteflexed; measures $4\frac{1}{4} \times 3\frac{1}{4} \times 2\frac{3}{4}$ in. Wall thick, $1\frac{1}{4}$ in. Uterus fibrous and tough, and shows a meshwork of interlacing fibrous bands. The vessels are gaping and prominent on cut surface. In the broad ligament they are sclerotic and tortuous. The endometrium is thicker than normal; a few retention cysts. The appendages are small and have no appreciable deposit about them (clinical exam.). Elastic tissue, n. s. There is widespread fibrosis, most marked in the middle and

outer third of the uterine wall. There is considerable degeneration of the muscular tissue in the areas where the fibrosis is most marked. The lymphatics are enormously dilated, especially in the outer part. In some fields there is a thickening of the media and adventitia; in other places it looks normal. The veins are "markedly affected" and show an apparent loss in caliber.

Contraction of broad ligament drawing uterus to left, also thickening and infiltration of broad ligament. Thickened endometrium and lacerated cervix with eversion and catarrh.

CASE 38. Age 51. Married 31 years; five children, last 22 years ago; no miscarriages. For six weeks has had metrorrhagia, and for some years has had menorrhagia, gradually increasing. Previous operation, n. s. Leucorrhœa, n. s. Menstruation regular until 6 weeks ago; increase in flow for several years. Vaginal hysterectomy in March, 1906, and partial morcellation. Other systems than genital show nothing abnormal that is noteworthy. R. V. O.; rectocele. Uterus retroverted and free; appendages free; ut. cavity $3\frac{3}{8}$ in., partial morcellation. Thick and œdematous walls. On section the vessels stand out prominently. Curettage before hysterectomy negative. Appendages free (clinical examination). Elastic tissue, n. s. Widespread fibrosis (the peculiar hyaline appearance noted before). The muscular tissue shows marked degeneration, especially in the subperitoneal region; occasionally there is complete atrophy. The adventitia is markedly increased. The media is fragmented and shows a ground glass appearance. Slight increase in the intima of most vessels.

Retroposition. Œdema of uterus.

CASE 39. Age 47. Married 26 years; five children, the last six years ago; miscarriages, n. s. Duration 5 years. Previous operations, n. s. Menorrhagia for 5 years; metrorrhagia for 3 years. Leucorrhœa, n. s. Menstrual periods regular until 3 years ago. Operation. Vaginal hysterectomy in November, 1905. Probable cause: "Well marked degree of arteriosclerosis and early interstitial nephritis." Relaxed vaginal outlet; prolapsed uterus. Uterus measured $4\frac{1}{2} \times 3\frac{1}{4} \times 3$ in.; $1\frac{3}{8}$ in. thick. Free of adhesions. Thick and indurated fibrous tissue strands. Endometrium healthy, but hæmorrhagic in appearance. Media changes in vessels and deposit around them. Uterine artery sclerosed, prominent, and gaping. Appendages free (clinical exam.). Elastic tissue, n. s. Fibrous tissue increased, compact, and without fibrillation; poor in nuclei. Swelling and fragmentation of muscular tissue; in some places degeneration. Media enormously thickened, cell outline lost; in smaller arterioles media and intima; in some intima alone. Veins are affected as much as the arteries.

Prolapse of uterus. Arteriosclerosis (general) and nephritis.

CASE 40. Age 43. Married 22 years; five children, last 8 years ago; miscarriages, n. s. Duration 2 years. Curettement, repair, suspension, and nephrorrhaphy in 1900. Metrorrhagia for 6 months; menorrhagia "off and on" for 2 years. Leucorrhœa, n. s. Menstruation regular until 2 years ago. Vaginal hysterectomy in September, 1904. Probable cause, general advanced arteriosclerosis; trace of albumin in urine. Other systems normal. Suffers from loss of memory and poor intellect. Uterus $4 \times 3\frac{3}{8} \times 2\frac{3}{4}$ in.; thickness $1\frac{1}{4}$. In anteposition, no adhesions. Cervix cystic and enlarged. Uterus almost cartilaginous. Mucosa slightly hypertrophied; thick hyaline media of vessels. On section the arteries gape, are tortuous, indurated, and prominent. Appendages free (clinical exam.). Elastic tissue, n. s. Great fibrosis. Degeneration and atrophy of muscular tissue. Swelling and hyaline degeneration of media. Adventitia greatly increased by real fibrosis. Intima very thick — hyaline; lumen in some vessels reduced. Fibrosis affects veins much. No change in lymphatics.

General arteriosclerosis. Nephritis. Cystic cervix.

CASE 41. Age 58. Married 29 years. Children seven; no miscarriages. Duration 3 years. Previous operation, n. s. Menorrhagia for 3 years; metrorrhagia for 6 months. Leucorrhœa, n. s. Menstruation regular until 3 years ago. Vaginal hysterectomy in July, 1904. Probable cause, cardiac hypertrophy and marked arteriosclerosis. Diathesis, n. s. Uterus $3\frac{1}{2} \times 2\frac{1}{2} \times 2$ in.; $\frac{3}{4}$ in. thick. No adhesions. Cervix large and cystic. Uterus fibrous and tough; interlacing fibrous strands. Endometrium thicker than normal; sclerosis of media. Uterine artery tortuous and much sclerosed. Appendages free (clinically). Elastic tissue, n. s. Fibrous tissue vastly in excess — fibrillated type; few nuclei; increased toward peritoneum. Great degeneration and atrophy of muscular tissue. Lymphatics markedly dilated. Adventitia shows some fibrotic change. Media hyaline with few nuclei. Thickening of intima and marked reduction of lumina. Veins also involved in arteriosclerosis.

General arteriosclerosis and heart disease. Cystic cervix. Thick endometrium.

SALOWIJ — 1907

CASE 42. Age 41. Married; three children; three miscarriages, last 3 years ago; complicated with hydatiform mole. Duration $1\frac{1}{2}$ years. Previous operation, curettage 18 months ago. Endometritis glandularis. Another curettage 5 weeks later; and another in April, 1905. Condition of endometrium, n. s. Metrorrhagia at irregular intervals. Leucorrhœa, n. s. Vaginal hysterectomy April, 1905, 10 days after last curettage. Uterus 11 cm. long; cervix $4\frac{1}{2}$ cm.; thickness of wall, 2 cm. Consistency, creaks on cutting. Net-like fibres appear in the wall; vessels stand out prominently, open mouths. On the posterior vaginal wall and fundus there are numerous small fibroid nodules, the *majority lying near the mucosa*. On the posterior wall of the uterus there is an open vessel containing a thrombus from which the severe hæmorrhage probably occurred. Mucous membrane normal but had been curetted ten

days before. Fibrous tissue increased. Muscular tissue diminished. Arterial changes, great thickening of the media especially; in some places homogeneous with very few nuclei. In places hyaline degeneration. No change in intima. The adventitia is often involved in the overgrowth of the vessel wall and directly connected with the *perivascular* connective tissue.

Submucous myomata.

REINECKE — 1897

CASE 43. Age 40. Married 18 years; eight children; miscarriages, n. s. Duration, 4 years, since last child. Curettage in May, 1896. Menorrhagia 8 to 14 days. Leucorrhœa, n. s. Operation, total extirpation in July, 1896. Menstruation regular until last confinement. Probable cause, n. s. Diathesis, n. s. Uterus retroflexed; replaced with difficulty. Relaxed vaginal outlet. Uterus measures 9½ x 6 x 4½ cm. Cervix 3 cm. Wall of uterus 2½ cm. Consistency very firm; yellowish-white spots seen on cut surface. Vessels project from cut surface. Lumina open. Endometrium thin and pale; covered with blood-tinged mucus in spots; quite atrophic. Adnexa, n. s. Fibrous tissue very much increased. Poor in nuclei. Muscular tissue, in some places the muscle bands appear smaller. The capillaries and mucosa of the vessels are widened and filled with blood. Thickening of the adventitia and media of the arteries of the body of the uterus; little involvement of the intima. The adventitia of the veins is especially affected; the intima is normal.

Retroposition. Nothing said of general condition.

CASE 44. Age 45. Married; four children; miscarriages, n. s. Duration 4 years. Repeated curettings. Metrorrhagia; leucorrhœa, n. s. Total extirpation, at what time, n. s. Menstrual history before, n. s. Probable cause, n. s. Hypertrophied cervix; relaxed vaginal outlet; no cysts or polypi of the cervix; uterus anteflexed. Uterus measures 10½ x 6 x 5 cm. Cervix 4½ cm. Thickness of uterine wall 3 cm. Consistency increased. Blood-vessels stand out from cut section. Endometrium 2 mm. in thickness. Glands slightly corkscrew in appearance; rich in blood-vessels; filled with blood. Fibrous tissue increased, especially the perivascular fibrous tissue running between the muscle bundles. Muscular tissue appears normal. Vessels, great thickening of the adventitia and media; lumen increased; intima affected only in spots. Where the intima is affected it appears roll shaped, and is thrown into folds, but there is no degeneration or infiltration of the intima. In the media there is an occasional pale-colored mass free of nuclei, but there is no evidence of inflammation.

Nothing said of heart or kidney condition, or condition of the adnexa. Clinically at the first examination the endometrium was supposed to be polypoid; at the second one it was described as swollen only.

CASE 45. Age 43. Married; five children; no miscarriages. Duration from April, 1895, to July, 1896. One curettement seven days before hysterectomy. Several large pieces of tissue removed by curettage; histological examination showed suspicion of carcinoma. Metrorrhagia; three weeks continuous hæmorrhage. Leucorrhœa, n. s. Total hysterectomy, September, 1896. Menstruation from 1894 to 1895, irrregular. Amenorrhœa and metrorrhagia alternating. Probable cause, n. s. Heart, lungs, and liver, normal. Uterus in anteversion; cervix, tear on right side, rather rough inside. Cervical mucosa normal. Uterus measures 9½ x 5½ x 4½ cm. Cervix 3½ cm. Wall 8½ cm. Consistency increased. Creaks on cutting. Fine connective tissue strands throughout the muscle. Vessels project; mouths open. The endometrium is rich in blood-vessels; otherwise, n. s. Adnexa healthy. There is no abnormal increase either of the perivascular or intermuscular connective tissue. The muscular tissue shows an apparent slight occasional isolated degeneration of the muscle fibres in the middle of the uterus. The degeneration is apparently fatty. No specially marked changes in the vessels. The media is somewhat hypertrophied; the adventitia is also hypertrophied, but to a less extent. The intima is normal. Slight degeneration of the media in spots. No changes in the vessels of the mucosa.

Hysterectomy was done in this case, not because of recurring hæmorrhage, but because carcinoma was feared. Possibly fungoid endometritis.

CASE 46. Age 45. Married; twelve children. Puerperal complications with some; miscarriages two, the last in 1894 — no doctor. Duration from February until July. Curettage July 1st. Amenorrhœa alternating with metrorrhagia. Leucorrhœa whitish (existing for a long time). On July 14th a total vaginal hysterectomy was done. Menstrual period every three weeks; profuse for three days. Probable cause, n. s. Heart and lungs normal. Uterus 9 x 4½ x 4 cm. Cervix 3½ cm. Walls 1.8 cm. Portio thick and knobby. Cervix open. Soft friable masses inside. Consistency "firm." Vessels project. First curetting showed epithelium proliferated and suggestive of cancer. Remains at time of operation too small to describe. Cervix shows mucoid degeneration of the mucosa in spots. Adnexa, left side normal, but induration of right parametrium, and adhesions to uterus on that side. Fibrous tissue, entire musculature drawn through with larger or smaller strands coming from the perivascular tissue and the adventitia. No atrophy of muscular tissue. In a number of the medum-sized arteries there is proliferation of the intima producing slit-like contractions of the vessel. No degeneration or infiltration. The other arteries show a normal intima; but a number exhibit isolated spots of fatty degeneration in the media and adventitia.

Hysterectomy 3 days after dilatation and curettage on account of the suspicion of carci-

noma. Hæmorrhage probably due to thickened mucosa or to inflammation of the parametrium.

WITTEK — 1906

CASE 47. Age 51. Single. No labors. No miscarriages. Duration one year. Began suddenly two years after menopause. Repeated curettings. Metrorrhagia. Leucorrhœa, n. s. Panhysterectomy, November 1, 1899. Menstruation always regular up to menopause, 2½ years before operation; duration 6 to 7 days. Amount of flow slightly increased just before menopause. Probable cause, n. s. Uterus 10½ x 7½ x 5½ cm. Cervix 3 cm. Wall 2½ cm. Consistency increased; creaks under the knife. Vessels project from cut surface, open mouths, rigid walls. Endometrium pale; intact; not much thickened. Some obliteration of vessels of fundus. On bimanual examination, ovaries and tubes seemed normal; otherwise, n. s. Fibrous tissue not especially increased; muscular tissue, n. s. In the big vessels there is an overgrowth of media and occasional hyaline changes. The intima is affected only in the larger vessels where it is thickened and there is hyaline degeneration in spots. Adventitia is not especially increased. Some of the vessels of the fundus are obliterated. There is no sign of previous inflammation. The veins and lymphatic vessels are normal. *No especial increase in the elastic tissue of the vessel walls.*

General condition?

CASE 48. Age 46. Married; five children; one miscarriage. Duration since abortion 6 years ago. Curettage at time of abortion, and again in February, 1900. The uterus replaced in 1898. Metrorrhagia. Leucorrhœa, n. s. Panhysterectomy in October, 1900. Menstruation regular and occasionally free up to time of abortion. Probable cause, n. s. Uterus 9½ x 6 x 4.8 cm. Cervix 2 cm. Wall 2½ cm. Uterus somewhat displaced backward and moves with difficulty. Consistency very hard. Strings of fibrous tissue plainly evident. Open mouths of vessels project from cut surface. Glands of mucosa are slightly dilated. Mucous membrane is pale yellow in color and not thickened. In the cervix there are isolated cysts. There is some obliteration of the vessels at the fundus. Adnexa, n. s. The elastic tissue is increased in the intima of the largest veins. This increase is also noticed in the media of the middle sized ones. Fibrous tissue, n. s. Muscular tissue, n. s. In the medium and largest arteries there is striking increase of the intima, causing partial obliteration in some cases. The media in such cases is often hypertrophied and also hyaline. The adventitia is also increased and surrounds the larger vessels with halos. The adventitia shows almost no nuclei and is continuous with broad bands of fibrous tissue running in between the muscle bundles. There are similar changes in the veins. There is a great richness of the vessels just beneath the mucosa.

Retroposition of uterus. General condition not given.

CASE 49. Age 48. Married; fourteen children; three miscarriages, last 2 years ago. Duration one-half year. Curettage when symptoms first began and test excision of cervix. Metrorrhagia. Some leucorrhœa. Panhysterectomy in February, 1900. Menstruation before was regular, but always free. Probable cause, n. s., but six silk ligatures found in the cervix at the time of admission to hospital. Uterus anteflexed; measures 11½ x 7½ x 6 cm. Cervix 2½ cm. Wall 3½ cm. Consistency very hard. Dirty gray strings of fibrous tissue. Vessels open mouthed and protruding. Mucosa pale, and atrophied in places. Vessels of fundus obliterated. Adnexa normal on palpation; otherwise, n. s. Fibrous tissue greatly increased in connection with hypertrophy of adventitia. The muscle fields are very much diminished. The vessels show the same changes as have been described for Cases 1 and 2 together with a deposit of calcareous material.

Ligatures in cervix, probably explained hæmorrhage.

CASE 50. Age 48. Married; eleven children; one miscarriage. Duration one-half year. Began suddenly at Easter, 1905. A number of curettements. Metrorrhagia. Leucorrhœa, n. s. Panhysterectomy, n. s. about date. Menstruation before was regular until October, 1904, then had apparent menopause. No hæmorrhage between this time and Easter, 1905. Probable cause, n. s. Uterus measured 12 x 8 x 6½ cm. Cervix 3 cm. Wall of uterus 3 cm. Consistency very hard with white fibrous strands. The vessels project from the cervix on section and are surrounded by clear rings of fibrous tissue. The vessels of the broad ligament are stiff and open. There are deposits of lime in the uterine artery. The endometrium is atrophic. Some of the glands are cystic. Marked obliteration of the small capillaries of the fundus. Adnexa normal upon palpation; otherwise, n. s. Fibrous tissue, n. s. Muscular tissue, n. s. There are marked degenerative changes of the vessels, such as already described for Cases 1 and 2. Some of the vessels are obliterated. (I am unable to tell from the text whether the obliterated vessels spoken of in each case are in the endometrium or the myometrium. In Case 4, however, the statement is definite, that they were present in the endometrium.)

Nothing said about general condition, nor of the position of the uterus.

FOTHERGILL — 1903

CASE 51. Age 32. Married in June, 1895. No children. One miscarriage in July, 1895. Curettage in July, 1891, for glandular endometritis. Two curettements after abortion. Atmocausis in 1892. Metrorrhagia for 10 years. Leucorrhœa bloody. Hysterectomy several months after atmocausis. Menstruation before was regular until the age of 21. Probable cause, n. s. Uterus somewhat enlarged. Consistency so firm that "almost impossible to make sections." Vessels grossly, n. s. Adnexa, n. s. No further data of case given.

Too incompletely reported. Not included in summary of 62 cases.

BARBOUR — 1905

CASE 52. Age 46. Nine children, last at age of 43. Two miscarriages after fourth child. Symptoms have lasted one year. No previou operations. Menorrhagia one year; metrorrhagia 19 weeks; leucorrhœa, n. s. Panhysterectomy, date not given. Menstruation regular to one year ago. Probable cause, n. s. Uterus 9½ x 6 cm. Wall 2½ cm. Consistency n. s. Vessels stand out prominently on section. Plexus of wide vessels with thickened walls in each broad ligament; at one point commencing calcareous degeneration of the vessel. The endometrium is grossly normal. Histologically, marked thickening of the capillaries. The right ovary shows cystic degeneration the size of a pigeon's egg. Left ovary sclerosed. The tubes are healthy except for subperitoneal cysts here and there. The fibrous tissue is slightly increased. The muscular tissue shows no obvious change. The vessels are increased in number, and the walls are very thick due to an increase in the middle coat. There is less hypertrophy in the outer, and some in the inner coat. There is hyaline degeneration of some of the smaller arteries.

No remarks concerning the general condition of the patient nor the position of the uterus. Cystic degeneration of the right ovary.

ADDINSELL — 1906

CASE 53. Age 33. Married 13 years; one child 12 years ago; miscarriages, n. s. Duration of symptoms since childbirth. Curettage in 1902 and twice in 1903. Metrorrhagia. Abdominal hysterectomy in 1905. Menstruation was normal up to marriage. Probable cause, fever and internal inflammation for three months following labor. Uterus 3 in. long. Consistency, walls "rather denser than normal." Vessels grossly, n. s. Endometrium is scanty, but normal except for small, round cell infiltration in the depths. Adnexa on palpation, normal; otherwise, n. s. Fibrous tissue increased; undergoing hyaline change. Muscular tissue diminished and œdematous. Arteries thickened in the inner coat; also in the outer one. Perivascular and periglandular infiltration. A few small, round cells. (There is a good microphotograph of hyaline change in the fibrous tissue.)

No remarks on the general condition of the patient or the position of the uterus.

CASE 54. Age 31. Married 11 years. No children; miscarriage in April, 1901, followed by an infection. Symptoms since miscarriage. Currettage in April, 1901. Metrorrhagia. Leucorrhœa, n. s. Hysterectomy in 1902. Menstruation normal up to time of miscarriage. Other description similar entirely to Case 1.

No account of the general condition of the patient or the position of the uterus.

CASE 55. Age 31. Married 11 years. One child 18 months after marriage. No miscarriage. Symptoms since childbirth. Curettage three times; repair of laceration of cervix in 1897. Metrorrhagia. Profuse leucorrhœa. Vaginal hysterectomy in 1899. Menstruation before regular. Probable cause, n. s. Cervix hypertrophied. Uterus probably prolapsed. Transverse laceration of cervix extends to the vaginal vault. The uterus is thickened, especially the anterior and posterior cervical lips. No measurements given of the uterus. Endometrium normal. Adnexa by palpation normal; otherwise, n. s. Fibrous tissue increased, running in broad bands between the muscle cells; in some places there is degeneration. The muscle is split into small islands in some places. The smaller blood-vessels show increase in the lymph. There is also a round cell infiltration around the blood-vessels in some places. (This case Addinsell regards as the second stage of chronic infective metritis.)

Displacement of uterus, laceration, and hypertrophy of cervical lips.

CASE 56. Age 31. Married, n. s. One child 9 years old; one miscarriage in 1897. Symptoms since miscarriage. Previous operations, n. s. Metrorrhagia; leucorrhœa, n. s. Hysterectomy in 1901. Menstruation regular until time of miscarriage. Probable cause, gonococcal infection and miscarriage. Uterus 3 in. long. Consistency, n. s. Vessels grossly, n. s. Endometrium normal. Adnexa, n. s. Fibrous tissue, n. s. Muscular tissue greatly atrophied; scarcely any to be seen. Enormous increase of small vessels and lymphatics. Great thickening of interior coat of vessels; undergoing hyaline degeneration.

General condition not described; neither condition of adnexa nor position of uterus.

All of Addinsell's cases are directly related to miscarriage or labor and are evidently real instances of chronic metritis.

KUBO

CASE 57. P. No. 5123. Age 52. Married. Two children. One miscarriage a year after last labor. Duration, 6 years. Curettement, July, 1901, March, '96, and in '97. Metrorrhagia; leucorrhœa, very little. Hysterectomy, July 25, 1901. Menstruation before always free. Probable cause, heart disease. Systolic murmur heard at apex, transmitted to axilla. Hæmoglobin, 44 per cent. Uterus, 9 x 5 cm., diameter, 1½ to 3 cm. Consistency, n. s. Clinically not palpable; n. s. in pathologic description. Endometrium polypoid. Elastic tissue, n. s. Fibrous tissue, hypertrophy; muscular tissue, hypertrophy; several small interstitial fibroids in uterine wall.

Heart disease. Fibroids.

CASE 58. P. No. 6250. Age 47. Married. Two children, last one 18 years ago. Miscarriage n. s. Duration, March to November, 1902. Previous operation, n. s. Menorrhagia and metrorrhagia; none during the past 4 weeks. Leucorrhœa profuse

and persistent. Hysterectomy, November, 1902. Menstruation, regular to March, 1902. Pain and dragging in lower abdomen. Morphia habit. Uterus, 10 x 6 x 5½ cm., diameter uterine wall, 3 cm. Adnexa not removed; apparently normal. Hypertrophic glands of endometrium. Fibrous tissue somewhat increased. There are large dilated lymph spaces or veins in the musculature; hard to say which.

What about the general condition? What about the position of the uterus? Endometrial hypertrophy.

CASE 59. P. No. 7853. Age 43. Married. Two children, youngest 21 years old. No miscarriages. Duration, May, 1904, to September, 1906. Previous operation, n. s. Metrorrhagia. Leucorrhœa, n. s. Supravaginal hysterectomy. Menstruation before was regular, considerable in amount. Marked relaxation of pelvic floor; uterus enlarged clinically; according to pathological description, normal in size. Adnexa normal; fibres apparently increased; concerning other details, n. s.

General condition nothing said. Relaxation of pelvic floor. Possibly displacement of uterus.

CASE 60. P. No. 9018. Age 37. Married. Eight children, youngest, 2½ years; five miscarriages, last three months ago. Duration, indefinite. Previous operation, n. s. Menorrhagia. Leucorrhœa moderate. Supravaginal hysterectomy. Menstruation before was regular. Probable cause, subinvolution. Uterus slightly enlarged, soft and boggy to palpation; walls 2½ cm. thick. Vessels prominent on section of uterine wall. Right adnexa normal; left cystic ovary, by palpation. Endometrial hypertrophy, fibrous tissue normal. Kubo gives this as a case of subinvolution, retroflexed and retroposed uterus. Of other details, n. s.

Subinvolution. Left cystic ovary. Retroposition.

CASE 61. P. No. 9228. Age 28. Married. Three children, youngest 3 years; no miscarriages. Duration, June to November, 1905. Previous operation, curettement, November, 1904, to May, 1905. Metrorrhagia. No leucorrhœa. Operation, n. s. Menstruation before always considerable. Probable cause, hypertrophy, endometrium. Vessels prominent on cut section of uterine wall. Adnexa could not be palpated; patient very fat. No increase of fibrous tissue. Muscle normal. Vessels normal. Of other details, n. s.

Hypertrophy of endometrium. General condition not given

CASE 62. P. No. 11708. Age 35. Married. Five children; one miscarriage 5 years ago. Duration, n. s. No previous operation. Menorrhagia. Hysterotomy with resection; uterus slightly enlarged and firm, otherwise pelvis normal. Chronic endometritis. Increase of fibrous tissue, arising from adventitia of blood-vessels, and thickening almost obliterating some of the vessels.

Chronic endometritis. General condition not given.

CASE 63. P. No. 12026. Age 41. Married. One child; no miscarriages. Duration, several years. No previous operation. Menorrhagia becoming metrorrhagia. Leucorrhœa, n. s. Operation hysterectomy. Menstruation before, regular. Uterus enlarged and flabby, 11 x 8½ cm. Adenomyoma.

Adenomyoma.

CASE 64. P. No. 12087. Age 34. Married. Five children; no miscarriages. Some leucorrhœa. Hysterotomy and resection. Uterus free, fundus enlarged, 3 cm. thick; otherwise, pelvic examination normal. Chronic endometritis with dilated vessels. Slight increase of fibrous tissue; muscular tissue, n. s. Thickening and some obliteration of vessels. Dilated veins and lymph spaces.

Chronic endometritis.

CASE 65. P. No. 11468. History unknown. Specimen sent to laboratory. Uterus two times its normal size, 13½ x 10 x 4½ cm. Wall, 3 cm. in diameter. Small fibroma right side, subserous interstitial position. Small fibroid nodule near mucosa. Hypertrophy and chronic inflammation of the metrium. Adenomyomatous projection of glands into uterine wall. More or less increase of fibrous tissue.

Not included in series as there is no history.

ANALYSIS OF SIXTY-TWO OF THE PRECEDING CASES REPORTED IN THE LITERATURE

SOCIAL CONDITION

Age			
20 — 30	3	Married	52
30 — 40	25		
40 — 50	26	Single	5
50 — 60	7		
60 — 70	1	N. S.	5
Total	62	Total	62

Children		Miscarriages	
0	10	0	15
1	8	1	14
2	6	2	8
3	7	3	4
4	3	4	0
5	8	5	3
6	0	6	1
7	2		
8	2		
9	1		
10	2		
11	2		
12	3		
14	1		
N. S.	7	N. S.	17
Total	62	Total	62

Duration of Symptoms

Under 6 mos.	5
Under 1 year	14
Under 2 years	5
Over 2 years	28
N. S.	10
Total	62

Menstrual Symptoms

Menorrhagia	13
Metrorrhagia	44
N. S.	5
Total	62

Menstruation Before

Regular	25
Regular to menopause	4
Profuse	9
Irregular	1
N. S.	23
Total	62

Leucorrhœa

Marked	6
Slight	11
None	1
N. S.	44
Total	62

Previous Operations

Curettement	30
Suspension	2
Plastic	3
Myomectomy	1
None	6
N. S.	20
Total	62

Complicating General or Local Lesions Possibly Accounting for the Hæmorrhage

Fibromyoma	5
Adenomyoma	2
Cancer	1
Pelvic peritonitis	4
Heart disease	4
General arteriosclerosis with kidney or heart affected	3
Varicose veins of broad ligament	2
Malposition, retroposition, prolapse	12
Silk ligatures left in cervix	1
None	1
N. S.	27
Total	62

Operation Performed

Hysterectomy	51
Hysterotomy	2
Post-mortem	2
N. S.	7
Total	62

Consistency of Uterus

Harder	27
Softer	4
Normal	2
N. S.	29
Total	62

Diameter of Uterine Wall

Normal	4
Above 1.5 cm.	20
Above 2 cm.	12
Above 2.5 cm.	15
Thin	1
N. S.	10
Total	62

Uterine Vessels Grossly

Normal	0
Prominent	18
Sclerosed	3
Calcified	6
N. S.	35
Total	62

Condition of the Adnexa

Normal	19
Diseased	7
N. S.	36
Total	62

Endometrium

Normal	22
Thickened	24
Atrophic	8
N. S.	8
Total	62

Fibrous Tissue

Normal	9
Increased	37
Diminished	5
Hyaline degeneration	3
N. S.	8
Total	62

Muscular Tissue

Normal	8
Increased	6
Diminished	24
Hyaline degeneration	11
N. S.	13
Total	62

Uterine Vessels Histologically

Perivascular or intramural degeneration	35
No degeneration	6
N. S.	21
Total	62

TECHNIQUE AND METHOD OF EXAMINING THE AUTHOR'S CASES

I wish at this point to express my thanks to Dr. Lawrence F. Isman, late resident physician at the Kensington Hospital, for valuable help in the preparation of this paper. I am indebted to Dr. Isman for the cutting and staining of the sections and for many pertinent observations.

Preparation of sections. The specimens were fixed in formalin 4 per cent. and hardened in alcohol. Either of these agents is suitable when the sections are to be stained by Weigert's or Van Gieson's method. After opening the uterus in each case through the anterior wall, a wedge of tissue was removed below the level of the round ligament to the left of the incision. This was made to include the entire thickness of the myometrium and the endometrium, and was cut at right angles to the long axis of the uterus. A second wedge was cut from the lateral wall of the cervix, just at the point of section (in supravaginal hysterectomy) or at the internal os (in panhysterectomy), including the adjacent parametrium.

This tissue was embedded in celloidin and mounted upon vulcanite blocks; sections of a uniform thickness of 30 m. were cut from each block and stored in 80 per cent alcohol.

Thinner sections were desirable, but it was found impossible to obtain an average for the entire series, less than 30 m. Where it was expedient, serial sections of 10 m. were made. A large number of trial sections were stained by Weigert's and by Van Gieson's method, in order to determine the exact technique for accomplishing the best results — that is to say, to bring out most perfectly the elastic, muscular, and fibrous tissue. It was found that the sections stained by Weigert's stain alone, without any counter stain, exhibited best the elastic tissue, which appears intensely black in a homogenous field. For differentiating the fibrous and muscular tissue, Van Gieson's stain, without any preparatory treatment by means of hæmatoxylin was used. This brings out very clearly the fibrous tissue as a brilliant red and the muscle as a deep yellow.

In preparing the permanent specimens for histologic examination, sections from each block were stained by Van Gieson's,[1] by Weigert's[2] and by the ordinary hæmatoxylin-eosin methods; the technique in every case was identical.

The sections were examined with the naked eye lying flat upon a white surface and held up to the light, and upon the stage of the microscope at a magnification of 130 and 650 diameters.

To secure accuracy in the comparison of the same specimen stained by the three different methods, sketches of important fields were made by means of a camera lucida.

Relative proportion of elastic tissue. The degree of increase of elastic tissue in the arterial walls (intramural degeneration) and in the periphery of both the veins (perivenous degeneration) and the arteries (periarterial degeneration), I have designated as being scanty, moderate, marked, and excessive.

Relative proportion of fibrous and muscular tissue. The proportion of fibrous and muscular tissue outside the vessels, as shown by Van Gieson's stain, is more difficult to determine than are the changes in the elastic tissue. Van Gieson's sections may be judged by comparing their color under an ordinary reading glass. An estimate of the proportion of fibrous as compared to the muscular tissue, is quite impracticable by any other means. Under a greater magnification one sees too little of the section at a time, and in different fields there are different proportions, so that the only satisfactory way to get the proportion as a whole is to view the entire section and note its color. This is easily done. I took, as a standard, the uterus of a 17-year-old nulliparous woman. In this, under low magnification, about an equal mixture of yellow and red could be discerned. Cases showing more yellow were designated yellow; those showing more red were marked reddish yellow, yellowish red, red, or very red as the case might be.

[1] Van Gieson's method. Van Gieson's stain: Saturated watery solution of picric acid, 10 parts: one per cent watery solution of acid fuchsin, one part. This solution was freshly prepared each time: the proportions were accurately measured with a pipette. After floating the section in water it was immersed in Van Gieson's stain 3 min.; water, 10 sec.; 95 per cent alcohol, 1 min.; absolute alcohol, 2 min.; cleared in carbol-xylol and mounted in Canada balsam.

[2] Wiegert's resorcin-fuchsin method. Wiegert's resorcin-fuchsin stain: 25 c.c. of a 2 per cent watery solution of resorcin and 25 c.c. of a 1 per cent watery solution of fuchsin (not acid fuchsin) are placed together in a porcelain dish over a Bunsen burner. After actual boiling has started 6½ c.c. of Liq. Ferri. Sesquichlor. U. S. P. are added and the mixture is boiled for 3 to 5 minutes longer. After cooling, the mixture is filtered. The filtrate is thrown away. After all the water has evaporated from the residue on the filter paper, the latter is placed in the porcelain dish first used (which has not been cleaned, and contains some of the dried precipitate of the first mixture) with 50 c.c. of 95 per cent alcohol. This is placed over the gas flame and boiled. After the alcohol has dissolved the residue from the filter paper, the latter is fished out of the solution. The solution is allowed to cool and is then filtered. The filtrate is brought up to 50 c.c. with fresh 95 per cent alcohol and 1 c.c. of hydrochloric acid (c.p.) is added. Sections were stained by placing them in Weigert's resorcin fuchsin stain, 2 hours; 95 per cent alcohol, 1 min.; fresh alcohol, 3 min.; absolute alcohol, 1 min.; cleared in xylol 12 hours and mounted in Canada balsam.

COMPARISON OF THE CLINICAL AND HISTOLOGICAL FEATURES IN TWENTY-THREE UTERI REMOVED FOR CAUSES OTHER THAN HÆMORRHAGE

Case No.	Age	Married or Single	Children	Miscarriages	Leucorrhœa	Menstrual Flow	Metrorrhagia	Chief Complaint	Provisional Diagnosis	Revised Diagnosis	Thickness of Uterine Wall	Perivascular Venous Degeneration	Intramural Arterial Degeneration	Perivascular Arterial Degeneration	Color by Van Gieson's Stain	Remarks
1070	17	S	0	0	Yes	Regular 7 days	No	Pain	Pelvic Inflammatory	Pelvic Inflammatory	10 m.m.	None	None	None	Yellow and red	
1293	20	S	0	0	N. S.	N. S.	N. S.	Infection	Puerperal Metritis Autopsy	Same		None	None	None	Yellowish red	
1448	20	M	1	0	Yes	Regular	No	Pain	Non-puerperal Metritis	Same		Moderate	Slight	None	Red	Slight glandular hypertrophy
935	21	S	0	0	No	Regular	No	Infection	Puerperal Metritis. Autopsy	Same		None	None	None	Yellow and red	
428	30	S	0	0	No	Regular Profuse	No	Pain	Pelvic Inflammatory	Same	9 m.m.	None	None	None	Reddish yellow	
587	32	M	0	0	Yes	Regular	No	Pain	Pelvic Inflammatory	Same	17 m.m.	None	None	None	Red	Glandular endometritis
437	37	M	0	0	No	Regular	No	Pain	Pelvic Inflammatory	Same	10 m.m.	Slight	None	None	Reddish yellow	
692	37	M	0	0	No	Regular Profuse	No	Pain & Menorrhagia	Pelvic Inflammatory	Same	19 m.m.	None	None	None	Yellowish red	
936	22	S	1	0	Yes	Regular	No	Pain	Pelvic Inflammatory	Same	19 m.m.	Marked	Moderate	Slight	Reddish yellow	
1069	23	M	3	0	Yes	Regular	No	Pain	Pelvic Inflammatory	Same	19 m.m.	Moderate	Moderate	Marked	Red	
643	25	M	1	0	Yes	Regular Profuse	No	Pain	Pelvic Inflammatory	Same	22 m.m.	Moderate	Moderate	Moderate	Red	
254	28	M	1	0	Yes	Irregular Profuse	Occasional	Pain	Pelvic Inflammatory	Same	12 m.m.	Moderate	Moderate	Moderate	Yellowish red	
686	29	M	1	0	No	Irregular Scanty	No	Pain	Pelvic Inflammatory	Same	16 m.m.	Slight	Slight	None	Yellowish red	
400	31	M	1	0	Yes	Regular	No	Pain	Pelvic Inflammatory	Same	12 m.m.	Slight	Slight	None	Yellow and red	
447	32	M	2	0	Yes	Regular Profuse	No	Pain	Pelvic Inflammatory	Same	21 m.m.	Moderate	Slight	Excessive	Yellow	
689	35	M	2	0	Yes	Regular Scanty	No	Pain	Pelvic Inflammatory	Same	14 m.m	Moderate	Moderate	Marked	Yellowish red	
618	36	M	8	0	Yes	None since last labor	No	Pain	Puerperal Metritis	Same	25 m.m.	Marked	Marked	Marked	Yellow	
382	37	M	4	3	Yes	Regular	Slight	Pain	Pelvic Inflammatory	Same	17 m.m.	Moderate	Moderate	Marked	Yellow and red	Glandular hypertrophy
1498	37	M	5	4	Yes	Irregular	Yes	Pain and Hæmorrhage	Pelvic Inflammatory	Same		Marked	Slight	None	Red	Right pyosalpinx. Right ovarian abscess
415	41	M	6	2	No	Regular	No	Pain	Pelvic Inflammatory	Same	17 m.m.	Excessive	Marked	Moderate	Reddish yellow	
796	41	M	1	0	No	Regular	No	Dysmenorrhea	Hyperplasia Uterus?	Same	16 m.m.	Moderate	Slight	Moderate	Red and yellow	
1033	56	M	8	0	Yes	Regular	No	Dragging Pain	Descensus Uteri	Descensus Uteri	22 m.m.	Marked	Marked	Slight	Red	
972K	41	M	0	0	N. S.	N. S.	N. S.	N. S.	Atrophy of Uterus; Pelv. Inflam.	Same	N. S.	None	None	None	Yellowish red	

COMPARISON OF THE CLINICAL AND HISTOLOGICAL FEATURES IN FIFTEEN UTERI REMOVED ON ACCOUNT OF MENORRHAGIA OR METRORRHAGIA

Case No.	Age	Married or Single	Children	Miscarriages	Leucorrhœa	Menstrual Flow	Metrorrhagia	Chief Complaint	Provisional Diagnosis	Revised Diagnosis	Thickness of Uterine Wall	Perivascular Venous Degeneration	Intramural Arterial Degeneration	Perivascular Arterial Degeneration	Color by Van Gieson's Stain	Remarks
709K	35	M	5	0	Slight	Profuse Prolonged	Yes	H'morrhage and pain in left side	Myopathic Hæmorrhage	Same	20 m.m.	Marked	Slight	Slight	Yellowish red	2d cardiac sound exaggerated. Slight glandular hypertrophy
1392	36	M	4	3	Slight	Irregular	Nearly Constant	H'morrhage	Myopathic Hæmorrhage	Same	30 m.m.	Moderate	Moderate	Slight	Reddish yellow	Enlarged heart. Booming first, accentuated 2d
958	39	M	2	8	Yes	Irregular	Constant	Hæmorrhage	Myopathic Hæmorrhage	Same	20 m.m.	Marked	Moderate	Moderate	Yellowish red	Mitral heart disease. Syphilis (Intermed.). Cystic endometritis
1244	40	M	5	1	Slight	Regular Profuse	Increasing	Bearing down and H'morrhage	Myopathic Hæmorrhage	Same	28½ m.m.	Moderate	Marked	Marked	Reddish yellow	Retroposition of uterus
827K	42	M	2	N. S.	N. S.	Irregular	Constant for 6 weeks	H'morrhage	Myopathic Hæmorrhage	Same	20 m.m.	Moderate	Slight	Marked	Red	Cysticendometritis; cystic ovary 6 x 3 x 2. Subperitoneal fibroid 4 x 1 m.m.
559	42	M	2	1	Yes	Irregular	Constant	H'morrhage	Myopathic Hæmorrhage	Same	25 m.m.	Moderate	Slight	Moderate	Red	
694K	42	M	6	3	Yes	Irregular	Every 2 weeks	Bearing down, hæmorrhage	Myopathic Hæmorrhage	Same	23 m.m.	Excessive	Marked	Moderate	Yellow and red	Slight systolic murmur at apex
558	42	M	10	3	No	Irregular	Constant	H'morrhage	Myopathic Hæmorrhage	Same	17 m.m.	Moderate	Slight	None	Reddish yellow	
1634	45	M	3	2	Yes	Irregular	Constant Slight	Pain, Leucorrhœa H'morrhage	Myopathic Hæmorrhage	Same	25 m.m.	Moderate	Marked	Moderate	Very red	Retroposition
93	46	M	8	0	Yes	Irregular	Constant	H'morrhage	Myopathic Hæmorrhage	Same	25 m.m.	Excessive	Moderate	Excessive	Very red	Cystic degeneration of cervix
1109	50	M	4	0	Slight	Irregular	Constant	H'morrhage	Fibroid tumor	Myopathic hæmorrhage	26 m.m.	Moderate	Slight	Slight	Red	
807	51	M	4	1	No	Irregular	Constant	H'morrhage	Myopathic hæmorrhage	Myopathic hæmorrhage	21 m.m.	Moderate	Moderate	Marked	Red	
897K	52	M	6	0	N. S.	Irregular	Marked at Intervals	H'morrhage	Myopathic Hæmorrhage	Same	27½ m.m.	Excessive	Marked	Marked	Red	Marked mitral regurgitation. Varicocele of broad ligaments
737K	55	M	13	2	Yes	Menopause 3 years before	Yes	H'morrhage	Myopathic Hæmorrhage	Myopathic hæmorrhage	20 m.m.	Excessive	Excessive	Excessive	Reddish yellow	Arteriosclerotic vessels in broad ligament. Deep bilateral laceration of cervix. Descensus and retroposition. Cystocele rectocele
1488	70	M	9	0	Yes	Menopause 23 years ago	Yes	Prolapse	Atrophied Prolapsed Uterus	Senile Uterus Prolapse	15 m.m.	Excessive	Excessive	Excessive	Red	Adnexa normal. Atrophied endometrium

SUMMARY OF HISTOLOGIC AND CLINICAL FEATURES IN TWENTY-THREE UTERI REMOVED FOR CAUSES OTHER THAN HÆMORRHAGE, AND FIFTEEN UTERI REMOVED ON ACCOUNT OF HÆMORRHAGE

Relation Between Arteriosclerotic Changes and Hæmorrhage

All Cases	Hæmorrhage Cases
Excessive, 4; all had metrorrhagia, 100 per cent.	Excessive 4
Marked, 10; 5 (50 per cent) had menorrhagia or metrorrhagia. 5 had no abnormality in the menstrual flow.	Marked 5
Moderate, 13; 11 (84 per cent) had menorrhagia or metrorrhagia. 2 had no menorrhagia or metrorrhagia.	Moderate 5
Slight, 4; 2 (50 per cent) had menorrhagia or metrorrhagia. 2 had no menorrhagia or metrorrhagia.	Slight 1
None, 6; 2 (33⅓ per cent) had menorrhagia or metrorrhagia. 4 had no menorrhagia or metrorrhagia.	

Relation Between Arterial Changes and Pregnancies

All Cases	Hæmorrhage Cases
Excessive, 4; average pregnancies 9½	Excessive, 4; average pregnancies 9½
Marked, 10; average pregnancies 5 1/10	Marked, 5; average pregnancies 8¾
Moderate, 11; average pregnancies 3 6/11	Moderate, 5; average pregnancies 4½
Slight, 4; average pregnancies 4	Slight, 1; average pregnancies 13
None, 8; average pregnancies 0	

Relation Between Arterial Changes and Age

All Cases	Hæmorrhage Cases
Excessive, 4; average age 55¾	Excessive, 4; average age 55¾
Marked, 10; average age 39.5	Marked, 5; average age 43⅜
Moderate, 13; average age 37.7	Moderate, 5; average age 41
Slight, 4; average age 30.5	Slight, 1; average age 42
None, 8; average age 29⅜	

It may be seen that the closest relation exists between the parity and the arteriosclerotic changes. Next between the age of the patient and the arterial changes. There is no constant relation between the arterial changes and menorrhagia and metrorrhagia, although the 4 excessive cases were ones of hæmorrhage,—they were from the women most advanced in years, in whom a hysterectomy for causes other than cancer or hæmorrhage is exceptional. Those exhibiting scanty arterial changes were just as often hæmorrhagic uteri as those showing marked changes.

Relation Between the Amount of Fibrous Tissue as Indicated by the Color of the Section Stained by Van Gieson's Method and the Number of Pregnancies

All Cases	Hæmorrhage Cases
Very red, 2; average pregnancies 6½	Very red, 2; average pregnancies 6½
Red, 12; average pregnancies 4⅓	Red, 6; average pregnancies 4⅝
Yellowish red, 7; average pregnancies 2	Yellowish red, 1; average pregnancies 10
Reddish yellow, 10; average pregnancies 5.6	Reddish yellow, 4; average pregnancies 10¼
Yellow and red, 5; average pregnancies 4⅜	Yellow and red, 2; average pregnancies 7
Yellow, 2; average pregnancies 5	

Relation Between Color and Hæmorrhage

All Cases	Hæmorrhage Cases
Very red, 2; both metrorrhagia, 100 per cent.	Very red 2
Red, 12; 7 (58 per cent) had menorrhagia or metrorrhagia. 5 had no abnormality in menstrual flow.	Red 6
Yellowish red, 7; 4 (57 per cent) had menorrhagia or metrorrhagia. 3 had no abnormality in menstrual flow.	Yellowish red 1
Reddish yellow, 10; 6 (60 per cent) had menorrhagia or metrorrhagia. 4 had no abnormality in menstrual flow.	Reddish yellow 4
Yellow and red, 5; 2 (40 per cent) had menorrrhagia or metrorrhagia. 3 had no abnormality in menstrual flow.	Yellow and red 2
Yellow, 2; 1 (50 per cent) had menorrhagia or metrorrhagia. 1 had no abnormality in menstrual flow.	

RELATION BETWEEN COLOR AND AGE

All Cases		Hæmorrhage Cases	
Very red, 2; average age	45½	Very red, 2; average age	45½
Red, 12; average age	43 5/12	Red, 6; average age	51⅛
Yellowish red, 7; average pregnancies	33	Yellowish red, 1; average age	39
Reddish yellow, 10; average pregnancies	38.1	Reddish yellow, 4; average age	45¾
Yellow and red, 5; average pregnancies	33.75	Yellow and red, 2; average age	38½
Yellow, 2; average pregnancies	34		

It will be seen that the proportion of fibrous tissue, as indicated by the color of the stained specimen, bears no constant relation to parity or to the symptoms of menorrhagia or metrorrhagia. While the two reddest specimens (very red) both were metrorrhagic, there was cystic degeneration of the cervix in one and retroposition of the other, which might have accounted for the hæmorrhage.

HISTOLOGIC FEATURES OF FOUR PURELY MYOPATHIC CASES

558. Age 42. Ten children; three miscarriages. Moderate perivenous degeneration. Slight intramural arterial degeneration. No periarterial degeneration. Red and yellow by Van Gieson's stain.

559. Age 42. Two children; one miscarriage. Moderate perivenous degeneration. Slight intramural arterial degeneration. Moderate periarterial degeneration. Red by Van Gieson's stain.

807. Age 51. Four children. Moderate perivenous degeneration. Moderate intramural arterial degeneration. Moderate periarterial degeneration. Red by Van Gieson's stain.

1109. Age 50. Four children; one miscarriage. Moderate perivenous degeneration. Slight intramural arterial degeneration. Slight periarterial degeneration. Red by Van Gieson's stain.

DETAIL OF FIFTEEN CASES OF SUPPOSED MYOPATHIC HÆMORRHAGE

1. G. No. 170. P. No. 93. W. C. Aged 48. Married. Eight children; no miscarriages. Always had leucorrhœa. Menstruation irregular before marriage, coming every two weeks to two months, lasting one week. Since marriage regular until eight years ago. Since then, profuse menorrhagia and metrorrhagia. Operation, panhysterectomy. Uterus, 10 cm. long. Endometrial cavity, 8 cm. long. No adhesions. Right ovary 3 x 2½ x 1 cm., cystic degeneration. Left ovary, 2 x 1½ x ½ cm., atrophic; tubes normal. Endometrium atrophic at fundus; pronounced cystic changes in cervix and lower part of endometrium. Palpable arteriosclerosis of uterine arteries.

2. G. No. 762. P. No. 558. S. C. Aged 42. Married. Ten children; three miscarriages. Until three years ago menstruation regular every twenty-five days; duration seven days. No pain. For past three years, irregular every two weeks to twenty-five days. Profuse; duration, 7 to 10 days. Physical examination, negative. Operation, supravaginal hysterectomy. Uterus 8 cm. from point of section to fundus. Uterine wall 17 m.m. thick. Endometrial cavity 6 cm. from point of section to fundus. No adhesions. Right and left ovaries 4 x 2 x 1½ cm. Tubes normal. No palpable sclerosis of uterine vessels.

3. G. No. 763. P. No. 559. A. C. Aged 42. Married. Two children; one miscarriage. Leucorrhœa at times. Metrorrhagia for two years. Operation, supravaginal hysterectomy. Uterus from point of amputation to fundus, 10 cm. No adhesions. Endometrial cavity from point of amputation to fundus, 8 cm. Right ovary, 5 x 4 x 3½ cm. Graafian follicle cysts. Left ovary and both tubes normal. Endometrium normal. No palpable sclerosis of uterine vessels.

4. G. No. 1176. P. No. 807. M. B. Aged 51. Married. Four children; one miscarriage. Profuse menorrhagia and metrorrhagia for past two years. Physical examination, negative. Operation, panhysterectomy. Uterus 8 cm. long. Uterine wall, 21 mm. thick. Endometrial cavity 6 cm. long. No adhesions. Right ovary 3 x 2 x 1 cm., normal. Left ovary 3 x 2 x 1½ cm., Graafian follicle cyst. Tubes normal. Endometrium normal. Palpable sclerosis of uterine vessels in broad ligament.

5. G. No. 1362. P. No. 958. E. S. Aged 39. Married. Two children; 4 miscarriages; 4 stillborn. Leucorrhœa constant. Menorrhagia and almost constant metrorrhagia for past year. Curettage three months before did no good. At that time examination of scrapings showed normal endometrium. Mitral heart disease. Operation, supravaginal hysterectomy. Uterus from point of section to fundus 8 cm. Endometrial cavity from point of section to fundus, 6 cm. Right ovary 4 x 3 x 2 cm., Graafian follicle cyst. Left ovary 4 x 4 x 2½ cm., hydrops folliculi. Tubes normal. No palpable sclerosis of uterine vessels.

6. G. 1583. P. 1109. Vol. 32. L. O. Aged 50. Admitted 8/25/'05. Reported on page 320.

7. Krouse, Mary. Aged 40. Admitted 3/16/'06. P. 1244. G. 1759, vol. 36. Reported on page 320.

8. Durkin, Amy S. Aged 36. Admitted 11/9/'06. P. 1392. G. 1892, vol. 40. Married 16 years. Four children; 3 miscarriages. Labors all difficult. Never went to full term. Labors always between seven and eight months. First one instrumental. Menstruation began at 15; always somewhat irregular. For the last four years, menstrual flow never lasted less than seven days, and sometimes continued a full month. Leucorrhœa, slight, odorless; greater amount after periods. Pain running from back to labia. Bleeding almost continuously. Free from hæmorrhage for no more than 2 to 3 days at one time. Pain in lower abdomen of a cramp-like nature, resembling labor pains. D. & C.

a year ago. Also D. & C., appendectomy and suspension of colon previously to present operation. Heart slightly enlarged to left. Booming systolic, and accentuated aortic second. Lungs, negative. Kidneys, negative, (normal). Uterus soft; 4 cm. from point of amputation to fundus. Walls 3 cm. thick. No adhesions. Right tube, 6 cm. long, ost. open. No adhesions. Right ovary 4 x 3½ x 2 cm. Cystic, Graafian follicles. Left tube 7 cm. long, ost. open. No adhesions.

9. Mrs. Christopher Morris. 10/10/'07. Married. Aged 42. Admitted 10/6/'06. Path. No. 694. K. H. Reported on page 322.

10. Mrs. J. F. Cress. Married. Aged 35. Admitted 10/10/'06, K. H. Path. No. 709. Complains of excessive bleeding at menstrual periods, soreness and dull aching in left ovarian region at time of menstruation. Some headache after periods and occasionally sharp, shooting pain in the pelvis. Also bleeding piles. The left-side pain or soreness dates from a time, 14 years ago, when the patient made a mis-step on the ice. She was treated subsequently for hernia. Over 14 years ago, patient had a fall and hernia which is said to have disappeared. Used a truss for six months. Curettage last June. No intense headache since. Had typhoid fever in 1890. Not well for some months afterward. Has had grip a number of times. Menstruation began at the age of 12; occurred every 21 to 23 days; duration, 6 to 8 days. Flow profuse. Five pregnancies. No miscarriages. Some leucorrhœa, but not troublesome. General examination negative, except that second cardiac sound is exaggerated. Specimen, uterus and adnexa by supravaginal hysterectomy. Uterus free from adhesions; rather soft; uterine cavity 4.5 cm. long; wall 2 cm. in diameter. Surface of uterine muscle on section shows numerous projecting tufts of fibrous-like tissue, which are presumably exposed blood-vessels. The surface of the hardened sections shows these areas as white points. No evidence of arteriosclerosis in vessels of broad ligament. Right tube, 7 cm. long, normal. Ovary 3 x 1.5 x 1 cm., normal. Path. diag., hyperplasia of uterus; slight interstitial endometritis.

11. M. C. Aged 55. K. N. 737. Married. Reported on page 321.

12. Mrs. R. M. C. P. 1634. Private floor, University Hospital. Married. Age 45. Married 21 years. Three children, aged 20, 18, and 15 years respectively. Two miscarriages at 16th and 20th years, each 4½ months. The first labor was instrumental — 24 hours long. After the first miscarriage (which was about 4½ months), she was not at all well until the next child. Lacerated after the last child and not repaired. Menses first appeared at 15; usually regular until the last two years, then every 23 days, though at times not for six or seven weeks. Duration, five days. Too free for the past two years; not painful. Last period, 9,18,07. Admitted to hospital, 9,18,07. Slight leucorrhœa before marriage. No increase recently. After the first miscarriage, had "intermittent" fever. After the birth of the next child was very well; almost robust. About two years ago, her menstrual flow, previously occurring every 28 days, became more frequent, occurring every 3 weeks, with an occasional cessation for 6 or 7 weeks. The flow also became more profuse, though not alarming, and lasting as usual, about five days. June 4, 1907, her regular period appeared, and continued interruptedly until about September 8th. This flow was free at times, but most of the time was a mere show. She was free from it for a week, when it again appeared and became more profuse than ever, and just stopped before admission. With this flow, considerable bearing down pain; usually no pain at periods. Recently her leucorrhœa has become quite watery. For the past six months this has increased, troubling her during the night. During the day only on unusual exertion. This ache was chiefly above the waist, extending to the shoulders. Below the waist, in the sacral region, she has more of a tired feeling. For some years she has had occasional attacks of severe pain in the left lower abdomen, giving her a desire to evacuate the bowels, which desire could never be gratified. Only relieved by heat and lying down. Such attacks last 10 or 12 hours, pain returning as soon as she stood up. The attacks were infrequent, and she has not had one for a year. Urinalysis: No albumin or sugar; few hyaline casts; hæmoglobin 70 per cent; white blood cells 10,000.

Specimen consists of uterus and adnexa removed by vaginal hysterectomy. Surface of uterus free and shows no adhesions. Uterus is 10 cm. in length; wall of fundus and body of fundus measures 2½ cm. Endometrium is atrophic so that there is a little mucous membrane covering; the surface has a rather shiny appearance; here and there little pits or depressions. Cut surface of uterine wall shows here and there whorls of tissue evidently indicating the position of some of the larger blood-vessels. No especial softness of uterine muscle, even in fresh specimen. Right tube appears perfectly normal, 7 cm. in length; right ovary measures 3 x 2½ x ½ cm., appears entirely normal. Left tube 6 cm. long, entirely normal in appearance. Left ovary measures 3 x 2 x ½ cm. Appears normal. Uterine artery on left side close to uterus feels somewhat sclerotic though this is not marked, and I am not even sure it should be pronounced sclerotic.

13. P. No. 897. C. No. 5630. Kensington Hospital. Reported on page 323.

14. Mrs. L. S. C. No. 5444. P. No. 827. Admitted to hospital 5,14,07. Continuance of pain in the lower part of the abdomen. Patient has been bleeding for the past six weeks. During the past two years the periods have been more or less irregular. The last regular period was in July, 1906. Six weeks ago the patient started to bleed and has been doing so ever since. She has had two pregnancies. Six years ago had a laceration of the perineum repaired. General physical examination negative, with the exception of fine moist rales at the base of the left lung, during and at the end of inspiration.

Pathological examination of specimen. The uterus is 9½ cm. from the fundus to the point of amputation. The endometrial cavity is 6 cm. long. The wall of the body of the uterus is 2 cm. thick. The right tube is

10 cm. long, and entirely normal. The right ovary is 6 x 3 x 2 cm., and has been converted into a cyst with a smooth lining. Very little ovarian tissue remains. The left tube is 10 cm. long, and entirely normal. The left ovary is 3 x 2½ x 1½ cm. The vessels of the broad ligament are not especially well defined and there is no arteriosclerosis. Some of the vessels of the wall of the uterus appear prominent, but not more so than is often observed in a normal uterus. There is a small fibroid measuring 4 x 1 m.m. on the anterior surface of the uterus just below the insertion of the left round ligament. Diagnosis: Diminutive subperitoneal fibroid; Graafian follicle cyst of right ovary, cystic glandular endometritis.

15. Mrs. E. H. G. No. 2092. P. No. 1488. Admitted 3,2,07. Age 70. Widow. Married 47 years. Nine children; no miscarriages. Suffered with prolapse of the uterus for 12 years. At present complains of irregular hæmorrhage from the vagina, although the menopause occurred 23 years ago. Has mitral insufficiency, some irregularity of the pulse, and 64 per cent of hæmoglobin. The uterus is completely prolapsed, and there are no adhesions. Operation, 3,13,07. Vaginal hysterectomy, anterior and posterior colporrhaphy.

Pathological report. Specimen consists of the uterus, cervix, and one tube. Uterus is 8 cm. in length, uterine wall 1½ cm. in thickness. The tube is 11 cm. in length and atrophied. The endometrium is atrophic, corresponding to the age of the patient. Diagnosis: Senile uterus with marked posterior sclerosis, hypertrophy of the cervix, normal endometrium.

ROLE OF THE LYMPHOID TISSUE IN INFLAMMATORY CONDITIONS OF THE ALIMENTARY CANAL, A SUGGESTION

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THE ideas which, from time to time, have occurred to me in regard to the explanation of the cause and situations of inflammatory conditions of the intestines were originally suggested by the work of C. H. Miller on "The Histology of Gastric Ulcer," appearing in the "Archives of the Pathological Institute of the London Hospital, vol. 1, 1906."

This work, which I had the privilege of watching during a large part of its conception and progress, deserves to rank among the classics of intestinal pathology. A brief synopsis of the most prominent features of the pathology of gastric ulcer will help to mark the steps which led to the complete and finished work that Miller has published.

The importance of circulatory disturbances in the formation of gastric ulcer was exhaustively demonstrated by Virchow and Cohuheim. Their work has been amplified by many other observers and their conclusions definitely established.

It is now known that any condition of infarction or thrombosis, or local arterial spasm, in fact, any condition that produces local ischæmia of the mucous membrane of the stomach, will predispose to ulcer of the mucous membrane.

The area of the mucous membrane which is supplied by the blocked arteriole has been shown to undergo necrosis and gangrene. But it is not logical to assume from this that circulatory disturbance, of this nature, is the sole cause of ulcer; it is no doubt an important one, but one only, of many predisposing factors.

The general circulatory diseases in which this condition of embolism is most pronounced are ulcerative endocarditis, miliary tuberculosis, and circulating malignant emboli.

It is important to note that it is the arterioles of the submucosa which are affected and that the subsequent ulcers are shallow in nature and affect the fundus of the stomach almost entirely. A condition of venous thrombosis which has led to the formation of gastric ulcers in this way is seen in extensive degenerative conditions of the blood-vessels. In one case described by Miller the vessels of the submucosa were exceedingly degenerated; the adventitia was infiltrated, the media thickened so much that the normal appearance of unstriated muscle was lost; the intima was thickened and proliferated to such an extent that the lumen was in places obliterated and ragged masses of clot were adherent to the walls. In this case it is interesting to learn that the ulcers were shallower than in the embolic forms.

Then Matthes, by animal experimentation, showed such was the redundancy of the gastric mucosa, that natural cure of denuded areas of mucous membrane was obtained by the filling up of these areas by the superabundant mucous membrane. It was also demonstrated by this observer that if the base of the denuded area was prevented, by sewing a glass ring to the peritoneal and muscular coats of the stomach, from contracting, the denuded area of mucous membrane was apt to undergo digestion, especially if the condition of hyperchlorhydria co-existed.

Thus we see that two essential conditions in the formation of gastric ulcer are circulatory disturbances and inability of the basement membrane and muscular coat to contract sufficiently to allow the redundant mucosa to obliterate a gap in the gastric mucous membrane. It remained for Miller to show that in the lymphoid tissue we have the primary focus of disease, and from this central point we get the two other factors, the circulatory disturbance and loss of muscular and membranous elasticity at the base of an ulcer.

Miller obtained his material from portions of living gastric mucous membrane removed at operation, from accident cases, and from stomachs fixed in 5 per cent formalin immediately after death.

The distribution of lymphoid tissue in the normal stomach is instructive. In the newborn infant there is no lymphoid tissue; at four months this tissue appears and increases in amount up to the age of fifty, when it gradually but completely tends to disappear. The lymphoid tissue is collected almost entirely in the region of the pylorus and lesser curvature.

In chronic dyspepsia it was shown that the most interesting pathological changes took place in the gastric mucosa. The cells of the mucous membrane were, over large areas, shorter, more irregular in shape, more indefinite in outline, and in places approaching the character of a squamous epithelial cell. I would like to suggest that here we have a close analogy to the condition of the bronchial mucosa in chronic bronchitis. The superficial cells are so often and continuously being exfoliated and shed in the bronchial excretion that the cells of the submucosa have to proliferate with great rapidity to supply the loss. The rate of proliferation accounts for the production of a more primitive and less specialized a cell; thus we find areas of bronchial mucosa which are lined by a flattened epithelium. So it is with gastric mucosa in dyspepsia. But the changes in dyspepsia are not confined to the mucosa; the basement membrane is thickened and infiltrated by round cells and its contractility impaired while the blood-vessels also show signs of infiltration of the media and intima.

Thus we see in chronic dyspepsia that we have two of the most marked factors in the production of gastric ulcer, that is, the degeneration of arterioles and the loss of contractility of the mucous membrane.

The third factor is supplied in an examination of the lymphoid tissue; in this condition of chronic gastritis the lymphoid tissue is increased in amount, especially in the region of the pylorus and lesser curve where, in normal stomachs it has been shown chiefly to exist. The masses of lymphoid tissue, normally pyriform in shape, resting with their bases on the basement membrane and with their apices covered by mucous membrane, are now seen to be irregular in shape and collected in such masses that they are in places totally uncovered by mucous membrane. Series of histological sections of gastric mucosa in acute or subacute cases of gastritis, especially in cases where "erosions" exist and in those cases of hæmatemesis, where a most careful and prolonged search fails to find any evidence of ulcer, show definite changes. The lymphoid tissue swells up and undergoes the classical evidences of inflammation, there is an exudation of the cells and a pouring out of lymph to such an extent that the lymphoid nodule swells, softens in the middle as in coagulation necrosis, and finally bursts into the cavity of the stomach. The inflammation and the action of the gastric juice open the vessels and hæmorrhage occurs.

Here then is the complete picture of the formation of gastric ulcer. Upon the underlying condition of chronic dyspepsia, the thickened and inelastic basement membrane and submucosa, the degenerated vessels, we have grafted the bursting of a lymph follicle. The

infiltrated tissue of the wall of the stomach prevents the redundant mucosa, already shown itself to be wanting or degenerate, closing the gap; the degenerate vessels are blocked and the ulcer cannot heal, in fact this obliterative endarteritis caused by the proliferation of the endothelium of the vessels actually predisposes to the spread of an ulcer.

It is my object to suggest that a very close analogy may be drawn between inflammation of the tonsil, that guardian of the upper alimentary canal, and other inflammatory conditions of the intestines; that the tonsil is the type upon which we found a basis of our understanding of inflammatory conditions of the lymphoid tissue of the alimentary canal.

The fact that there is normally no lymphoid tissue in the stomach of the newborn, and that gastric lymphoid tissue increases in amount up to middle life, and tends to disappear entirely in the later years of life, gives us an easy, if rather superficial explanation, of the rarity of acute inflammatory ulcerative conditions in children or the aged. The absence of lymph tissue in those individuals above the age of fifty will supply a pathological basis for the well known clinical findings in gastric conditions at this age. Thus we obtain pathological support for the dictum that, if a patient develops gastric symptoms for the first time after the age of fifty, it is more than probable that we have a case of carcinoma of the stomach to deal with rather than ulceration.

The incidence of lymphoid tissue at the pylorus and on the lesser curvature explains why chronic ulcers of the stomach are so much more common in those situations.

The number of stomach cases operated on without the discovery of an ulcer has long been a reproach to our clinical powers of diagnosis. In fact, Blake has gone so far as to say that no gastroenterostomy or drainage operation upon the stomach should be performed without very definite evidence of pyloric obstruction. That this is far too harsh a view is shown by the pathological findings in "erosion" and in chronic dyspepsia; in the latter conditions we have every element which predisposes to the formation, spread, and non-healing of an ulcer; the only one lacking is the actual softening and rupture of a swollen lymphoid follicle. It is notorious how very difficult it is to find an erosion or mucous ulcer at operation, and even how prolonged a search has to be made in the post-mortem room in very many cases.

Given a condition of chronic dyspepsia and a small erosion at or near the pylorus, and a very close analogy can be made between this condition and ulcer with fissure of the anus; just as in fissure of the anus we have a constant spasm of the rectal sphincters, with consequent overloading of the rectum and sigmoid, so in mucous ulcer, the base of which lies on the basement membrane and muscularis mucosæ, we have a constant pylorospasm with overloading of the stomach and improper emptying of that organ.

If we could show that this ulcer had a fair chance of healing, when it is reasonable to suppose that the spasm of the pylorus would cease, we would be justified in accepting Blake's dictum that an anastomotic operation is not desirable. But, here, we have the infiltrated and thickened basement membrane, the lack of redundant mucosa to close the gap, the hyperchlorhydria and the proliferation of the endothelium of the arteriole, with consequent partial or complete obstruction of the lumen. There is no reasonable chance of this ulcer, in a stomach showing the histological changes that are found in chronic gastritis, healing in a natural way.

Thus, I would modify Blake's statement and say that although in the majority of cases it is not wise to do an anastomotic operation upon a stomach without definite evidence of pyloric obstruction, yet, when one has a condition of chronic dyspepsia and there is any reason to believe an ulcer, no matter how small, is present, it is quite justifiable to perform an anastomotic operation and secure drainage of the viscus.

It is the pyloric obstruction that is the important feature, and if we get, as we do, as complete obstruction in some cases from spasm as from stenosis, we have to unload that stomach, and by giving rest to the ulcer, and removing the acid contents by drainage, to allow it to heal. There is no doubt in my mind that, one day, we shall seriously consider the routine re-establishment of the pyloric route by extirpating gastroenterostomy open-

ings, at subsequent operation, when the ulcer or stenosis has disappeared.

It has long been observed, in carcinoma of the pylorus, that the malignant infiltration spreads backward toward the fundus of the stomach but shows little or no tendency to invade the duodenum. The presence of the lymphoid tissue in the stomach must surely determine this method of spread; the protecting elements, to which we ascribe the immunity of the duodenum from carcinoma, the pancreatic secretion and the presence of Brunner's glands being, of course, absent in the stomach.

Inflammatory conditions of the small intestine show very definitely how the lymphoid tissue is the seat of infection. In the diarrhœa and intestinal catarrh of children the solitary lymph follicles and Peyer's patches are swollen and inflamed. In typhoid fever the pathological evidences of ulcer are confined almost entirely to Peyer's patches and the other lymph follicles. In dysenteric and other specific inflammation the same is seen. The only other chronic inflammatory condition which does not appear always to coincide with the distribution of the lymphoid tissue is tuberculous ulceration of the small intestine. In this condition the ulcers are transverse to the long axis of the bowel and do not always seem to coincide with the patches of lymphoid tissue, although, from what we know of the selective action of the tubercle bacilli on lymphoid tissue in other situations, we should expect that it would be so.

Personally I am not at all convinced that the cicatrizing stenotic conditions of ulceration in the small bowels are as often tubercular in nature as they are alleged to be. Often, in those cases, it is impossible to find the true picture of histological tuberculosis, and, in them there is only evidence of chronic inflammation. Of course, when there is a patch of miliary tubercles upon the peritoneal aspect of an ulcer there is no doubt as to the diagnosis.

There is a striking similarity between the behaviour of the three great intestinal sphincters, the pylorus, the ileocæcal valve and the anal orifice. In each of these positions there is a marked resemblance in behaviour toward ulcerative and inflammatory conditions. It is more than probable that there is an element of pyloric spasm with or without stenosis of the pylorus; spasm undoubtedly accentuates a stenotic condition and may so add to a small degree of stenosis as to cause obstruction at the pyloric outlet of the stomach. Similarly just as gall-stones, cholecystites, empyema of the gall-bladder, duodenal ulcer, round worms in the duodenum, and pancreatic affections can by their close contiguity cause pyloric spasm, so can an inflamed appendix, or an inflamed pile cause ileocæcal and rectal spasm respectively. The wonderful improvement in digestion, in the abolition of colicky intestinal pains and constipation which follows the removal of a chronically inflamed appendix is due, no doubt to the relief of the ileocæcal spasm. These symptoms have been alleged to be due to the adhesions which are present, but the small limitation of the movement or peristalsis which many of these adherent conditions can possibly cause, is not sufficient to account for them.

The pathology of the lymphoid tissue in appendicitis is intimately related to the cause of this disease and the anatomical structure of the appendix predisposes without any doubt to the rupture and gangrene of the organ. In appendicitis the lymphoid tissue undergoes the same inflammatory changes as is shown in the tonsil, the gastric lymphoid tissue, and in Peyer's patches. There is a pouring out of lymph, a swelling of the lymph tissue, and an exudation of the fluid products of inflammation. But in appendicitis we have all this going on within a comparatively inelastic tube of peritoneum; the pressure of the fluid products of inflammation compresses the tissue of the appendix against the rigid peritoneum, the vessels of the organ thrombose and perforation or gangrene results. There is no doubt that it is the structural peculiarity of this rudimentary organ which predisposes to such violent and disastrous inflammations.

The liability of all the natural sphincters of the intestine to damage, ulceration, and erosion seems to be an explanation of inflammatory and malignant conditions being most commonly met with in the cæcum, the hepatic and splenic flexures, the sigmoid, and the rectum. Until a comparatively recent date it was the custom to consider all chronic inflammatory conditions of the large gut as malignant. The excellent

results obtained by excision, and the cure of these apparent growths by the establishment of fæcal fistulæ was the cause of a modification of this opinion. It was then considered that some of these apparent growths might be tuberculous or syphilitic. Especially were the rectal carcinomata, which underwent a natural cure after iliac colostomy, said to be syphilitic.

A very careful examination of a large number of growths of the large gut has convinced me that many of them are purely inflammatory, neither malignant nor specific. Histological examination has failed to show the true picture of tuberculosis or of tertiary syphilis; there has been a notable absence of giant cells and the typical structure of tuberculous granulation tissue. In many cases there was definite evidence that these growths commenced in fissures, cracks, or ulcers of the bowel and their origin was often in the lymphoid tissue of the large gut.

There is a striking analogy to be drawn between the inflammatory conditions of the pyloric end of the stomach and those of the large gut. It is a bold surgeon indeed who would diagnose at operation between a chronic inflammatory condition of the pylorus and a carcinoma in many cases. Unless there are evidences of secondary deposits in the liver, or a massive infiltration of the fundus of the stomach, it is often impossible to differentiate the two conditions. The enlargement of glands in the gastrohepatic omentum is found quite as consistently in inflammatory as in malignant conditions; probably there is a greater tendency to enlarge from sepsis than from malignancy.

The enormous relief obtained by a gastroenterostomy is very closely allied to the wonderful effect often noticed after the formation of a fæcal fistula in large gut obstruction. Most of our cases of large gut obstruction caused by these apparently malignant growths die from intestinal obstruction and before the secondary deposits have time to form. It is notorious how very late is the involvement of the liver in cases of large gut carcinoma.

The involvement of iliac glands in growths of the sigmoid is said to be evidence of the malignant character of the growth; but histological examinations of these glands in doubtful cases show that sepsis is responsible for enlargement in a number of them.

I would advocate more boldness in surgery of these apparent growths of the large gut, and would consider only secondary deposits in the liver as a contraindication to operate. The enlargement of glands, and the hypertrophic nodular condition of a growth, I would consider to be evidence probably of an inflammatory nature. I would only diagnose carcinoma at operation in the narrow, thin, constricting forms of growth; these seem to be always carcinomatous.

The German teaching that gastric ulcer is very frequently the origin of carcinoma has resulted in a number of excisions of the pylorus being performed rather than gastroenterostomy. The extreme difficulty of telling at operation the difference between a chronic inflammatory ulcerative condition of the pylorus and carcinoma should incline us to perform a drainage operation such as gastroenterostomy, rather than to subject our patient to the grave risks of excision of the pylorus. If it were possible to get as satisfactory results in short-circuiting operations of the large gut as we see in gastroenterostomy we would be justified in preferring short-circuits to excision of growths of the colon. In the large gut, however, the results of short-circuit do not appear to be satisfactory from the tendency to fæcal accumulation in the blind loop.

This German teaching is based apparently upon the evidence of chronic ulcer, which can be found after very elaborate series of sections of pyloric carcinoma; it is not logical to accept this teaching in its complete form. It is certainly opposed to clinical evidence; our clinical judgment teaches us to look upon dyspeptic and ulcer symptoms which occur for the first time after fifty years of age, as malignant. Gastric symptoms of long duration, even if accompanied by much wasting or cachexia. we look upon as inflammatory.

I made at one time, a pathological examination of five cæcums which had been excised for carcinoma and which formed the basis of a paper by O. M. Jones in the Montreal Medical Journal, August, 1907. In only two of these was there definite evidence of malignancy; the others were purely inflammatory

in origin. The inflammatory cases were at operation and to the naked eye the more malignant of all, the cauliflower, exuberant, nodular form of growth was more marked in them.

It was very interesting to notice that, in the two malignant cases, the growth though apparently beginning in an ulcer close to the ileocæcal valve, where the lymphoid tissue is more abundant, exhibited no inclination to transgress the limits of the valve toward the ileum, but infiltrated extensively along the walls of the cæcum and up the ascending colon.

The behaviour of cæcal cancer was strangely comparable to pyloric cancer, which as we have said, infiltrates the walls of the stomach but shows no tendency to involve the duodenum.

THE HORMONE THEORY AND THE FEMALE GENERATIVE ORGANS[1]

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At first thought one is scarcely apt to associate the physiological phenomena embraced under the "hormone theory" with the function of the female organs of reproduction, and I have therefore felt that it might be of interest to determine to what extent the epoch-making discoveries of Starling and Bayliss might be applied to the physiology of these organs. The importance of a thorough knowledge of anatomy as a foundation for the study and practice of surgery has long been universally recognized, but it is only within recent years that the full importance of a similar knowledge of the physiology of the various organs as related to their surgical diseases has been forcibly impressed upon us. For example, essential as it is to the brain surgeon to know the situation of the various lobes, fissures, and convolutions of the brain, such knowledge is no more important than a familiarity with the functions of the various parts of this organ. Again, in the surgery of the thyroid, a knowledge of the anatomy of the gland is of course essential, and yet is it not also important to recognize the role of the thyroid in the body complex, as far as we know it, and to realize the unfortunate results of its complete removal, or the even more disastrous sequelæ of an inadvertent removal of the adjacent parathyroids? And so the examples might be multiplied.

As regards the surgery of the pelvic organs, it is true, perhaps, that the gynecologist has, in the main, paid due respect to such important and conspicuous physiological phenomena as menstruation, ovulation, and pregnancy, although even these are still far from being thoroughly understood. There are, however, other aspects of the physiological activities of the female reproductive organs which, while perhaps bearing with somewhat less force upon the surgery of these organs, still present many points of interest and value which make them well worth our careful study.

Since we are to be concerned in this paper with a special application of the "hormone theory," it may not be amiss to discuss very briefly the general physiological principles embraced under this term. This can perhaps be best done by recalling the classic observation upon which the theory was based. It was the great Russian physiologist Pawlow who first called attention to the fact that the injection of a dilute mineral acid into the duodenum provokes a secretion of pancreatic juice. This phenomenon he explained as being of a reflex nature, the efferent nerve of the reflex arc being the vagus. It was later demonstrated by his pupil, Popielski, however, that the same reaction could be elicited even after all the connections of the gut with the nervous system had been severed. While he still considered the phenomenon to be a reflex one,

[1] Read before the Baltimore City Medical Society, February 19, 1909.

therefore, he assumed that it must be of a local nature, involving only peripheral nerve centres.

It was on this assumption that the work of Starling and Bayliss was commenced. These observers soon found, however, that the experiment could be so devised as to exclude any influence whatever on the part of the nervous system, either central or peripheral, and that even under these conditions the reaction was obtained. For example, the injection of the dilute mineral acid into a loop of gut so prepared as to be attached to the rest of the body only by means of its blood-vessels was still followed by a flow of pancreatic juice no less marked than when injected into a normal loop of gut. It seemed evident, therefore, that the stimulus to the pancreas was carried by way of the blood stream. That the stimulating substance was not the acid itself was shown by the failure of the reaction to occur when the acid was injected directly into the blood-vessels. Since, then, there was such a difference in the effects produced by injecting the acid into the lumen of the gut and into the blood stream, it seemed clear that the active substance, or "chemical messenger," as Starling and Bayliss call it, must be some material elaborated in the intestinal mucosa under the influence of the dilute acid. Working on this hypothesis, they scraped off some of the epithelium of the bowel, rubbed it up with acid, and injecting the filtered mixture into the blood stream of the animal, were rewarded by obtaining a flow of pancreatic juice more profuse than any which had been seen in their other experiments. To this chemical messenger, the exact composition of which is as yet unknown, they have given the name of secretin, and its importance lies in the fact that it is only one of a large number of chemical messengers which, traveling by way of the blood stream from one organ to another, effect a correlation of the functions of the organs concerned. To this large and important group of substances Starling and Bayliss have given the name of "hormones." Other examples of hormones are carbon dioxide (the respiratory hormone), adrenalin (the hormone of the adrenal bodies) and the as yet unknown hormones of the thyroid, pituitary body, testis, ovary, etc.

It will be seen, therefore, that on the whole, these hormones correspond to the substances which we had hitherto been in the habit of speaking of as internal secretions. Our knowledge of internal secretions dates back from the time of Claude Bernard, who first employed the term. Originally the idea of internal secretions was associated more particularly with the so-called ductless glands, such as the thyroid, parathyroid, suprarenal, thymus, spleen, etc., organs which give off their only secretion into the blood stream ("Blutgefässdrüsen"). Later, however, it was found that many other tissues and organs, some with definite external secretions, possess in addition the function of internal secretion. Perhaps the best example of this twofold function is seen in the case of the testicle. Most of us are familiar with the classical experiments of Brown Séquard upon the so-called testicular extract, to which he attributed such wonderful rejuvenating powers. While the extravagant claims which he made for this substance were of course not verified, there is ample proof that the testes are concerned with the production of a hormone which exerts an important influence upon the general bodily economy. It was even claimed by Poehl that the active substance of the testicles could be isolated in crystalline form (spermin), but, as far as I have been able to learn, there has been no confirmation of his work.

In this connection it should be of interest to refer to the work of Seligman and Shattock upon sheep and fowl. These animals were selected for the experiments because they present certain definite sex markings, or, as they are called, secondary sexual characteristics. These observers showed that ligation of the vasa deferentia in young animals does not in any way influence the appearance of the secondary sexual characteristics, while if the testes are removed these sex markings invariably fail to appear. This, of course, seems to demonstrate that the sexual characteristics depend, not upon the external secretion of the testes, but upon some substance which they give off into the blood stream.

To extend the application of these broad principles to the reproductive organs of the female, it is a well known fact, first of all, that

removal of the ovaries is in the great majority of cases followed by a cessation of the menses. In animals, Knauer has shown that removal of the ovaries prevents the occurrence of heat or œstrus, and that, furthermore, if ovarian tissue be grafted into the muscles of the animal the periods reappear. This latter experiment is suggestive in both a positive and a negative way. Besides seeming to indicate the dependence of the œstrous cycle upon some substance given off by the ovary into the blood, it also shows that the dependence cannot be due, as some have claimed, to the nervous connection of the ovary with the uterus, for in the operation of transplantation any such nervous connection would of course be destroyed.

Even more striking are the results of Marshall and Jolly, who report that heat, or a transient condition resembling it, can be produced by the injection of extracts made from ovaries in a pre-œstrous or œstrous condition into a bitch at a period as remote as possible from œstrus. They state, furthermore, that when œstrous or pre-œstrous ovaries are successfully grafted into animals previously deprived of the ovaries, the condition produced is identical with normal heat, irrespective of the situation of the grafts.

While it is of course more difficult to make similar observations upon human beings, the results of transplantation of human ovaries, as performed by Martin, Morris, McCone and others, leave little doubt of the importance of the ovary in the production of the menstrual cycle. The old idea that menstruation is dependent upon the contact of the discharged ovum with the endometrium has been disproved by such observations as those of Tuffier, who reported thirty-two cases in which both tubes had been removed for inflammatory disease, the uterus and ovaries being conserved. In all these cases menstruation persisted in spite of the fact that the ovary was cut off from the uterus.

It is a fact familiar to all gynecologists that not infrequently menstruation will persist even after apparently complete oöphorectomy, but there can be but little doubt that in many of these cases ovarian tissue has inadvertently been left behind. Doran, for example, speaks of a patient in whom pregnancy occurred after supposedly complete removal of the ovaries. It is possible, of course, that in a certain number of cases the presence of supernumerary ovarian tissue may account for such phenomena. It seems to be true, however, that instances occur in which neither of the above explanations can be invoked, and this fact has led to the assumption on the part of some that the uterus can perform its function independently of the ovary, and even that the function of the ovaries is dependent upon the presence of the uterus and its secretions.

In a communication to the German Gynecological Congress of 1899, Zweifel and Abel found in tracing the after histories of cases of hysterectomy that when the body of the uterus had been completely removed entire atrophy of the ovaries always supervened, with menopausal symptoms similar to those seen after oöphorectomy. In three cases, however, in which a part of the uterine mucosa had been saved, menstruation persisted and menopausal symptoms were absent. Doran, from a study of sixty-five cases of subtotal hysterectomy, is inclined to support these views, advocating supravaginal amputation of the uterus in order to prevent the occurrence of sudden artificial menopause.

Such observations as these do not seem to be in accord with the results of experimental investigations into this subject. The work of Knauer, Sokoloff, Hofmeier, Benkiser, Buys, and Vandervelte, all seems to show that removal of the ovaries in animals is followed by atrophy of the uterus. This phenomenon is explained in various ways by different observers, but the studies of Limon show that the changes are not produced if the ovary is transplanted to some other part of the body, and hence it is not the severance of blood-vessels or of nerve connections which brings about the atrophy of the uterus. These results are confirmed by the work of Marshall and Jolly, who found in thirty-six cases of ovariotomy in rats that all showed atrophy and fibroid degeneration of the uterus, while in a number of transplantation experiments no such changes were seen when the graft "took." If the graft was unsuccessful, the degenerative changes were seen. Carmichael

and Marshall, as a result of much work upon the subject, reached the following conclusions, which would seem to epitomize the views most generally held, although the matter is still far from being settled:

1. Removal of the ovaries in young animals prevents the development of the uterus and Fallopian tubes, which remain in an infantile condition. The subsequent growth and general nutrition of the animals is unaffected.

2. Removal of the ovaries in adult animals leads to fibrous degeneration of the uterus and tubes, most marked in the mucous membrane. The subsequent health, etc., is good.

3. Removal of the uterus in young animals has no influence in preventing the further development of the ovaries, which are capable of ovulating and forming corpora lutea after adult life is reached.

4. Removal of the uterus in adult animals does not give rise to degenerative changes in the ovaries if the vascular connections are intact. These latter observations do not support the contentions of those surgeons advocating subtotal hysterectomy.

A question which naturally suggests itself is as to what portion of the ovarian structure is concerned in the production of the hormone, or hormones, of the ovary. Marshall and Jolly are inclined to believe that the internal secretion is elaborated either by the follicular epithelium or by the interstitial cells. The idea that the corpus luteum might be the portion of the ovary concerned with this function was originally conceived by Gustav Born, who, however, did not publish his idea, bequeathing it to his pupil Fraenkel. This writer believes that upon the secretory activity of the corpus luteum depends the occurrence of the œstrous cycle. His arguments, however, are not entirely satisfactory, and his views are not by any means generally accepted.

This author has recently published an interesting study based upon the results of castration in puerperal osteo-malacia. It has for some time been known that the removal of the ovaries, even though they be not diseased, exerts a very favorable influence upon the course of this disease. Without going into details, suffice it to say that Fraenkel, rather ingeniously, considers that osteo-malacia is the result of an excessive secretion of the ovarian substance, much as Basedow's disease is dependent upon a hypersecretion of the thyroid. Hence the good results of ovariotomy in osteo-malacia. He also states that independently of the secretion of the ovary into the blood stream, the same substance can form bodies of antagonistic nature, and that when the ovary is removed, these anti-bodies (ovarial-antikörper) may produce distressing symptoms. To the presence of these anti-bodies, rather than to the withdrawal of the secretion, he attributes the symptoms of an anticipated climacterium. To detect the presence of these bodies in the blood he makes use of a reaction (luteolysis) which he says is analogous to the hemolytic reaction in cases of malignancy.

He furthermore states that these ovarian anti-bodies are found in the milk and other secretions as well as in the blood, and in this connection, he records a rather remarkable case in which the feeding of the milk of an oöphorectomized goat brought about a most striking amelioration in the condition of a woman suffering from a very advanced form of puerperal osteo-malacia.

Suggestive and attractive as the whole theory of Fraenkel is, it is yet too early to be able to say how much truth it contains.

Whatever role, if any, the corpus luteum plays in the menstrual life of the woman, there is much evidence to indicate that it exerts a very important influence upon the gravid uterus. As already stated, Marshall and Jolly attribute the occurrence of the œstrous cycle to some substance formed either by the follicular epithelium or by the interstitial tissue of the ovary. They state, however, that after ovulation, which follows œstrus, the corpus luteum is formed, and that this organ forms a secretion which is essential for the changes which take place during the attachment and development of the embryo in the first stages of pregnancy. This idea probably owes its inception to Gustav Born, and is strongly supported by his pupil, Fraenkel.

Considerable experimental work has been done which seems to support this theory. Fraenkel found that if the ovaries of rabbits were removed from one to six days after

copulation, fixation of the ovum in the uterus was in every case prevented. On the other hand, if the ovaries were removed on or after the fourteenth day of pregnancy (the gestation period of a rabbit being thirty days), there was no interruption to gestation. Fraenkel even states that destruction of the corpora lutea alone with the cautery point, without removal of the ovaries, is sufficient to bring about the termination of pregnancy. While the accuracy of some of Fraenkel's observations has been questioned, there is considerable evidence to substantiate his views as to the function of the corpus luteum in pregnancy.

I have had the opportunity of observing clinically a case which seemed to confirm the correctness of this idea. A woman of thirty had missed one menstrual period, but two weeks later she commenced to bleed. The bleeding was very slight, but more or less continuous, and was associated with severe pains in the lower abdomen. The uterus was enlarged to the size of a two months' pregnancy, and a small, somewhat sensitive enlargement was palpated in the left side of the pelvis. A presumptive diagnosis of ectopic gestation was made. At operation, however, the enlargement was found to be a large left ovary containing what was considered to be a corpus luteum cyst. The uterus was enlarged and evidently the seat of an intrauterine pregnancy. The corpus luteum cyst was enucleated, the operation requiring only a few moments. Nothing further was done, but in spite of sedatives and opiates the woman aborted within thirty-six hours. It is of course very possible that abortion would have occurred even if the corpus luteum had not been removed, but in the light of what we have since learned of the probable importance of the corpus luteum in pregnancy, this case now seems quite suggestive. I have been told of another case quite similar to the one just described, which recently occurred in the practice of a prominent gynecologist of this city, who removed a corpus luteum in a case of unsuspected pregnancy, the first intimation of the woman's condition coming with the expulsion of the fœtus shortly after the operation.

Aside from the direct study of the functions of the generative organs a great deal may be learned by a study of the relations which they seem to bear to other organs, such as the breast, the thyroid, the suprarenals, etc. It has long been known that a close physiological relation exists between the uterus and the mammary gland, the most conspicuous example of this correlation of function being the phenomenon of lactation. While the primary cause of lactation has not as yet been definitely established, all the best evidence of recent years points to the generative organs as the source of the impulse giving rise to the process. The old idea that the function of the mammary gland is in some way dependent upon the nervous system would seem to be disproved by the experiment of Ribbert, who transplanted the mammary gland of a guinea pig beneath the animal's ear, the gland developing normally and producing milk when the animal became pregnant.

In this connection the recent work of Starling possesses a very positive value. This observer injected virgin rabbits with extracts made from various portions of immature rabbit fœtuses, and found that in such cases the mammary glands of the injected animals underwent changes similar to those seen in the glands during normal pregnancy. He concluded, therefore, that the hypertrophy of the glands seen during pregnancy is produced by a hormone formed in the body of the fœtus, and that the occurrence of lactation is due to the retrograde process set up when this substance is withdrawn by the expulsion of the fœtus, this retrograde process showing itself in the formation of milk. Foa has recently reported a large number of experiments which seem to corroborate those of Starling. Halban, on the other hand, states that the function of the mammary gland is due to an internal secretion of the ovary, except during pregnancy, when this function is temporarily assumed by the placenta, and that it is the expulsion of the placenta which determines the occurrence of lactation.

It will thus be seen that there is as yet no unanimity concerning the etiology of this process, but whatever the primary cause may be, it seems to be quite inseparably associated with the generative organs. A great

many other phases of this interesting relation which evidently exists between the mammary gland and the generative organs might be mentioned, such as the relation between lactation and menstruation, between lactation and castration, etc., but these are considered at length in the recent exhaustive article of Gellhorn, to which I would refer those who are interested in this subject.

With regard to the relation of the thyroid gland to the generative organs, little of a definite nature can be said, but that some relation exists would seem to be indicated by the marked swelling of the thyroid seen in many women at the menstrual epochs and during pregnancy, and also by such cases as the one recently reported of acute hyperthyroidism following oöphorectomy.

Not much more definite is our knowledge concerning the relation of the ovaries with the pancreas. Rebaudi, working in Bossi's clinic at Genoa, has reported in the past few months that he has been able to demonstrate a functional connection between the ovary and the pancreas. He holds that the islands of Langerhans in the pancreas form an integral part of a great system of organs with internal secretions, and that when the function of the corpus luteum in the ovary is diminished the islands of Langerhans show a marked hypertrophy, which he regards as compensatory, the islands evidently doing an extra amount of work. According to this observer, marked changes are also seen after removal of the ovaries or the mere destruction of the corpora lutea alone. He accepts this as an evidence of the functional importance of the corpora lutea as the chief if not the only portion of the ovary concerned in the production of an internal secretion. In this indirect manner, then, he arrives at conclusions essentially similar to those reached by Fraenkel in a very different way. (See above.)

Another exceedingly interesting functional relation of the generative organs which up to quite recently had received scant attention is the close connection which these organs seem to have with the suprarenal bodies. For bringing this matter prominently to the attention of the profession we are indebted to Bulloch and Sequeira, who in a recent article have shown in a forcible manner the influence which the suprarenal gland seems to exert upon sexual development. These authors report the case of a girl of eleven who suffered with a malignant hypernephroma, and who clinically presented remarkable symptoms of sexual precocity. She was very stout, her face presenting the appearance of a woman of forty, whereas she had previously been pale and thin. Her breasts were as large as those of a mature woman, and the pubes and axillæ were covered with hair. Were this the only case of this type which has been recorded, the association of such symptoms with the condition in the suprarenal might well have been regarded as a mere coincidence, but as Bulloch and Sequeira show, quite a number of similar cases have been reported (Fox, Ogle, Linser, Orth, Dolbertson, Bevan and Romkeld, Ritchie, etc.). In addition to these cases, in all of which the suprarenal was the seat of a tumor, others have been observed in which sexual precocity was associated with a hypertrophy of these bodies without any neoplasm (Adams). Marchand and Crecchio each report a case of spurious hermaphrodism, with enormous hypertrophy of the clitoris, associated with suprarenal hypertrophy. In Crecchio's case the masculine resemblance was particularly striking, the patient having twice contracted gonorrhœa in the role of a man.

The portion of the adrenal which is concerned in this interesting functional relation with the sexual organs is considered to be the cortex, which embryologically is closely connected with them, being derived from the mesodermic epithelium covering the fore part of the Wolffian body.

Animal studies seem to confirm the clinical observations thus collected, for it is said that rabbits show a marked hypertrophy of the adrenal cortex during pregnancy, while in birds and amphibians the adrenals increase in size during the period of heat.

Contrasted with such observations as these upon the influence of suprarenal overgrowth upon the sexual life, it is interesting to note that cases have been recorded which seem to show that retarded sexual development is sometimes associated with hypoplasia or atrophy of the adrenals. In Wissel's case, for

example, in a girl of eighteen there was an infantile condition of the genitalia, the mammæ were practically absent, the nipples very rudimentary, there were no axillary hairs, and practically none on the mons veneris. Autopsy demonstrated a striking hypoplasia of the adrenals. Similar cases have been reported by Karakascheff, Gelford, and Zander.

Many of the things which I have considered in this imperfect and, I fear, disconnected review, have dealt with matters of a theoretical nature rather than with absolutely demonstrated facts, but it is the experimenters and research workers who are the scouts of our profession, and who are continually finding the new vantage points which make possible the advance of the profession as a whole. In connection with such subjects as I have considered, the question arises, are such matters, aside from their important scientific bearing, of any real practical value to the gynecologist? I believe that this question must be answered in the affirmative. Without going into wearisome detail, it is only necessary as an example to point to the great advances which have been made in the surgery of the ovary. The time has passed when healthy ovaries were ruthlessly sacrificed to cure dysmenorrhœa, obscure pelvic pains, etc. It is true, of course, that the saner and more conservative methods of the modern gynecologist were literally forced upon him by a realization of the futility of the irrational and mutilating measures of former days, as well as by the awakening of the surgical world to the fact that it is only rarely in accordance with the principles of true surgery to remove tissue which is not the seat of disease, especially when such tissue can be shown to possess a definite and useful function. A restraining influence of no little importance has therefore been imposed upon us by the knowledge that the ovary, in addition to its well known function of ovulation, plays another more subtle role in the processes of the woman's body. At the same time, it is only fair to present the other side of the picture also. Such experimental work as I have described, as well as innumerable clinical observations, have shown that however important the hormones of the female generative organs may be, they are not by any means indispensable to life, or even usually to comparative comfort, and hence, from this standpoint there would seem to be no physiological basis for such ultraconservative operative measures as some would advise. While it is impossible to generalize concerning a question which is essentially an individual one, as regards both surgeon and patient, it would seem that radical conservatism, as it has been called, is scarcely less commendable than that unreasoning radicalism, pure and simple, which will not brook the restraint that knowledge and reason would impose.

DEPARTMENT OF TECHNIQUE

TAIT'S OPERATION FOR COMPLETE LACERATION OF THE PERINEUM[1]

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At our last meeting, June 19, 1908, during the discussion of Dr. Watkins' paper on his new operation for complete laceration of the perineum, I ventured the statement that, in my opinion, Tait's operation for complete tear was the best, because the most logically conceived. To this Dr. Watkins and Dr. Ferguson took exception by saying that Tait's operation was obsolete; that nobody performed it any more; that everyone was done with it. It being too late then and there to settle the controversy, I secured the privilege to take the matter up to-night. I do it now not so much to have a chance to refute the imputation of being an obscurantist, for clinging to an operation our leaders have long ago rejected, as to show what a good thing the profession apparently has forgotten.

An operation for complete tear of the perineum to be good must (1) protect the wound against infection from the torn rectum; (2) secure broad median coaptation of the torn peroneal body. Where these two indications are met, primary union and a working sphincter will be assured. I claim that Tait's operation for complete tear meets these two indications. Drs. Watkins and Ferguson deny it. Why this contradiction? Simply because what my censors mean by Tait's operation is not what I call by that name.

As a matter of fact, there are two versions of Tait's operation printed in English, differing materially, the one by Tait, the other by Mundé. Tait published his at the beginning of his career, in 1879, when he was little known outside of his own neighborhood; Mundé his in 1886, when Tait had reached the zenith of his fame. For this reason most of us here in America read Mundé's — if I may so call it — second-hand report, while very few ever read the original by Tait. I have no doubt that my controversy with Drs. Watkins and Ferguson arose because they denounced "Mundé's Tait," of 1886, while I upheld the essential features of Tait's own draft of his operation for complete tear, of 1879, with which they were apparently not acquainted.

To prove this I shall first present the two versions and then point out the unquestionable merits of Tait's operation, as described by Tait himself in 1879.

MUNDÉ'S VERSION

After a trip to England and the Continent, made in 1886, to watch the leading gynecologists at work in their operating rooms, Mundé published this graphic description of Tait's flap-splitting operation in his journal of September, 1886: "We also saw Tait do an operation for complete tear of the perineum. The patient had once before been operated on, but the sphincters had failed to unite. The operation was performed on the patient's bed, she being in the gluteodorsal position at the edge, her legs supported by an apparatus, Tait kneeling before her on the floor. With short, stout scissors, bent on the edge, he cut through the bridge of the perineum remaining from the first operation, and then thrusting the point of the scissors into the rectovaginal septum near the median line, with two strokes he cut outwards and slightly upwards to the border of the skin on either side, thus separating the vaginal rectal walls for a short distance. With a second incision on either side, but pointing downward, he loosened the separated edges of the sphincter ani muscles. All was but the work of a moment. With a straight Peaslee needle he first united the upper half of the wound, using three sutures of silkworm gut, which he took from his mouth. Then in the same way he drew together the posterior half of the wound with the sphincter with two sutures. When the sutures were all tied, the perineum certainly appeared restored, although there was not a perfect coaptation of the skin. No tissue whatever was removed, whether cicatricial or otherwise — certainly an advantage for a future operation, in case of failure to secure union."

Of course, one had heard a good deal of Tait's operation, from colleagues who had been abroad, before Mundé wrote the above, but to most of the readers of the journal, like to myself, the cited paragraph was the only detailed, authentic de-

[1] Read at a meeting of the Chicago Gynecological Society, September 18, 1908.

scription of Tait's operation they had ever seen in print. Like the rest, I then thought I knew all about it. On account of its obvious crudities, this operation never appealed to me, and it seemed quite natural that after a great initial flurry it should have become obsolete — as Drs. Watkins and Ferguson remarked.

TAIT'S OWN DESCRIPTION OF HIS OPERATION, PUBLISHED IN HIS "DISEASES OF WOMEN," 1879

"In case of complete tear of the perineum, my method of operating is this: I make two incisions about one inch and a half long, just at the margin of the skin and mucous membrane, and marking the edges of the torn perineum. These will be more or less apart, according to the depth of the tear. They should be nearly parallel, but somewhat converging towards the coccyx. The knife is carried right through the skin down to the subjacent tissues, and the rest of the operation is done by strong, sharp-pointed scissors. These are introduced just under the skin at the upper end of each wound, and run under the mucous membrane (cutting nothing else) about half an inch from each side inwards, meeting in the middle line, and forming a curve parallel with the margin of the torn septum. The lower lip of this wound is then seized by dissecting forceps and the mucous membrane carefully raised from the subjacent tissues as far as the edge of the rent, *but not separated at that edge*, so as to form a flap. This flap is turned downwards and backwards into the rectum. A stout curved needle armed with strong Chinese silk is then to be introduced about a quarter of an inch from the center of the skin wound on one side, and carefully carried through the tissues of the septum, till its point is within a quarter of an inch of the middle line. The point is then to be brought out in front of the flap and passed into the septum again at about another quarter of an inch on the other side of the middle line, and is then to be continued till it comes out at a point corresponding to its original insertion. The whole success depends upon this stitch, so that the utmost care must be taken with it. Two other stitches are similarly introduced, one in front of, and the other behind, the first stitch, and all three must be in front of the flap."

Of course, I was greatly surprised when, in 1895, I chanced to come across this, to me, second version of Tait's operation. After studying it carefully I concluded that it differed in vital points from what I had learned through Mundé, and that the differences seemed to prove the superiority of Tait's original conception. I therefore operated the next case of complete tear according to Tait's advice. The result was satisfactory, and since that time I have remained an adherent to this operation, and have advocated its performance whenever there was a chance for it, like to-night.

Now, in comparing the two versions it will be noticed that Tait gives, *first*, a detailed description of how to handle the torn rectum, while Mundé says practically nothing on this most important subject; *second*, that Tait recommends a stout curved needle for sewing instead of a straight one, as mentioned by Mundé. On these two points I base the claim that Tait's original device complies with the requirements of a good operation for complete laceration, *first*, by protecting the wound in the most simple and effective manner against infection from the torn rectum; *second*, by securing through the use of a curved needle broad median coaptation of the perineal body, and hence a working sphincter. To be more explicit:

1. *As to the handling of the torn rectum*, Tait does not sew the rectum; he sews only the overlying torn body of the perineum. It will be seen that Tait in this is doing, *mutatis mutandis*, what has been found to give such excellent results in vaginal fistula, namely, to disregard the hole in the viscus (bladder or rectum) and to sew only the vagina, after it has been freely loosened all around, to allow easy and broad coaptation. Easy and broad coaptation hastens union and minimizes the chance for infection from the viscus. But Tait secures additional effective protection against such infection by turning the flap left attached to the rim of the rectal tear downwards into the rectum. A little experimenting will show how this flap works: Turn it down into the rectum, then let go. You will notice that it gradually reverts toward the bed from which it was dissected, which proves that this tendency to return is alive after the wound has been closed; that it causes tight, intimate coaptation of the raw surfaces of the two halves of the rectal flap, and makes, therefore, stitching of the mucosa recti superfluous. Exposed by a Sims' speculum after the operation is all done, the rectal tear appears closed by a well-marked tight raphé.

2. *As to recommending a curved needle for sewing instead of a straight one*: The two ends of the torn structures of the perineal body having retracted sideways, it becomes necessary to dig in deep laterally, in order to bring them out into proper apposition in the median line. Accurate end to end contact of the torn sphincter is not to be aimed at, because impracticable, but broad, median coaptation of the two sides. If they unite by first intention, a working sphincter is assured. Deep sutures counteract the natural lateral tension and

help thus to support undisturbed that easy, broad coaptation which is necessary for primary union. Deep sutures, to be applied with this vital object in view, cannot be put in properly with a straight needle, but only with a curved one. Hence, explicit recommendation by Tait of a curved needle.

When I said that I strictly follow Tait's advice in operating for complete tear, I meant in handling the rectum, which is, of course, the most essential feature of the operation. In other points I have followed my own notion from the start. For instance, I remove entirely the flap formed in freshening the vaginal outlet, and sew the vagina with a running catgut suture. I also insert the needle, not within the perineal wound, but within the skin, at a convenient distance from the edge of the wound. Then I divide the rectal flap after it is detached, at the neck of the triangular rent, making two flaps, each attached to one side of the rectal tear, because I have found that two straight halves are easier turned down than the one triangular flap. I make the flap one-third of an inch wide. In trying to get the tissues well forward into the median line, I pick them up with a strong-toothed forceps, hold them drawn well towards the opposite side, even beyond the median line, while I insert the curved needle into the skin and bring it out at the proper point within the wound, close to the base of the turned-down rectal flap. What I call easy, broad coaptation of the two sides of the torn perineal body is helped materially if an assistant keeps the flaps turned down into the rectum by forceps, and if the knees are brought together as near as possible, while the sutures are inserted and tied. The three stitches mentioned by Tait refer to the length of the tear in the rectum. Usually one or more stitches are required to complete the perineum. They are silkworm and should be tied very carefully to avoid their cutting through.

As to the after treatment: The patient is kept on her back, may turn occasionally; the knees are tied together, flexed and supported by a pillow. The bowels are kept rather loose by daily doses of magnesia or enemas. The perineum is cleansed with irrigator, no wiping; catheter only when necessary. Stitches removed after the sixth day.

The following diagrams are added to illustrate Tait's method of handling the rectal tear, as practiced by me:

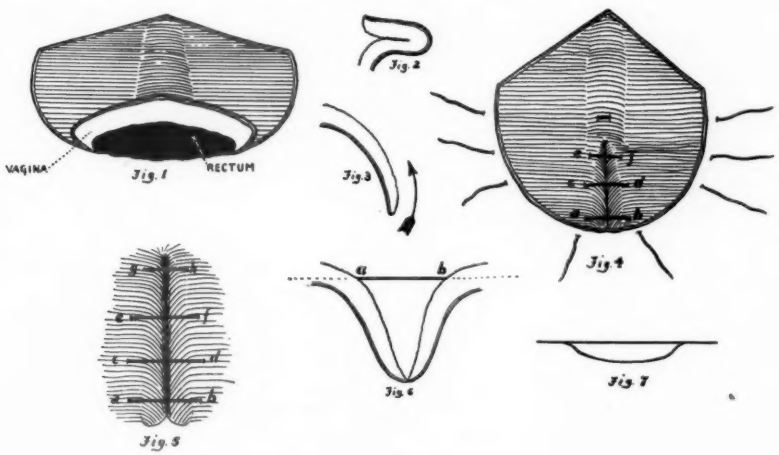

Fig. 1. Gives a view of the freshened vaginal outlet, with a ledge of vaginal surface (*V*) one-third inch wide, left all around the rectal tear (*R*). Drawn apart laterally.

Fig. 2. Shows in a cross-cut the aforesaid ledge dissected from the subjacent tissues, and changed into a flap, but still *in situ*. To save the reverting tendency of the flap, the dissection should not reach too close to the rim of the tear.

Fig. 3. The flap turned down into the rectum, then released, is trying to revert to its former bed.

Fig. 4. Shows the rectal flap turned down into the rectum. Three sutures inserted in front of the flap.

Fig. 5. (Somewhat enlarged.) Rectal flap turned down into the rectum. Sutures in front of it to show how, by tying the sutures, the two sides, marked by letters, must be drawn together, and the rectum be held outside of the closed bottom of the wound.

Fig. 6. The turned-down flaps, trying to revert, meet at their ends, with their raw surfaces. This contact, as the suture *a-b* (see Fig. 5) is adjusted, at once extends upwards to the bases of the flaps, and is perfect when the knot is made.

Fig. 7. The raphé-like projection in the rectum caused by the rectal flaps sticking closely together without sutures.

ACCIDENTAL PERFORATIONS OF THE UTERUS AND VAGINA

By H. G. WETHERILL, M. D., Denver, Colorado

Manual and instrumental perforations of the uterus and vagina of accidental origin doubtless antedate the written history of medicine; and though much has been recorded of late years regarding these misadventures, much more could have been told had all such cases been reported. For obvious reasons this has not been done; and it is left to inference and speculation to determine whether the record, as it stands to-day, gives a fair estimate of the ultimate results in such accidents.

Certain surgical innovations must have definitely affected the production and issue of these injuries, as for example, the furor for the use of the curette, placenta forceps, and bichloride douche on the one hand, and the perfection of the technique for abdominal operations, particularly of intestinal anastomosis and other visceral surgery, on the other. Then, too, the more recent growth of opinion favorable to the limitation of the use of the curette, placenta forceps, and the intrauterine douche, and the almost unanimous sentiment now prevalent against the intrauterine use of bichloride of mercury and other poisonous solutions, must have a favorable influence upon the production of such cases.

Perforations of the uterus and even of the vagina, either instrumental or manual, may occur without culpability on the part of the operator. Indeed they are known to have been made by the most expert and careful surgeons, and it is certainly no exaggeration to state that there are few surgeons and gynecologists of average experience to whom this accident has not happened. Furthermore, there is now so universal an admission of the inevitable and unavoidable character of the accident at times that few of one's fellow-unfortunates will hesitate to admit the mild impeachment.

Aimé Paul Heineck (Perforating Wounds of the Uterus, etc., Surgery, Gynecology and Obstetrics, October, 1908, Vol. VII, No. 4), in a comprehensive paper, reports 160 cases of uterine perforation taken from the American, English, French, and German medical literature from the years 1895 to 1907. He says: "Perforations of the uterus can and do occur with the most startling ease. . . . . They have occurred in the hands of the most clever operators. The accident has occurred to Lawson Tait, Case 1; Auvard (II) (Paris), had one perforation in 270 curettements. It cannot be stated that they are always due to ignorance, to incompetence, or to carelessness. It can be said, however, that all intrauterine instrumentations are dangerous in the hands of the novice, in the hands of the careless, in the hands of the surgically unclean."

Though uterine perforations may occur to careful and expert operators, the dangers expressed in the last half of the above paragraph are, after all, the important points for consideration; for in the hands of the experienced, careful, and surgically clean such perforations have almost a negligible element of risk.

He who can appreciate instantly when a perforation occurs, who does not irrigate, particularly with poisonous solutions,— which can do little good and may do endless harm — and who possesses the surgical skill and judgment to meet the emergency in either a conservative or a radical way, may feel little anxiety as to the ultimate result of such perforation per se.

My purpose in making this contribution is not to attempt to instill new thought into a subject now so well understood and agreed upon, but to put upon record some pertinent cases. I wish to make confession of such of these misfortunes as have come to me, and to relate such facts as may be related without injustice to others of two like cases of which I have definite and unmistakable information.

No attempt will be made to outline the treatment of uterine perforations, excepting as such treatment may be referred to in the report of the cases. It will be conceded, doubtless, that the general surgical principles underlying such treatment are established and accepted and that any differences of opinion which exist in regard to details would have to do with the question whether or not the abdomen should be opened above the pubis, for the closure of the uterine wound. That is after all a question which each operator must settle for himself in each individual case, with due reference to all the circumstances and surroundings.

Case 1. Mrs. A., aged 35, married, had borne three children; the last one in normal labor, four months previous to the operation. She had "dribbled" steadily since the delivery, had much pain in her back, legs, and lower abdomen, and migrainous headaches, from which she had suffered for many years. Examination of the pelvic organs discovered a large, flabby subinvoluted uterus with a lacerated cervix in extreme retrodisplacement, second degree prolapsus, and a general pelvic congestion and relaxation. Curettement, trachelorrhaphy, and ventrosuspension were advised, accepted, and performed; the operation being done at the home of the patient.

During the use of the ordinary Sims' sharp curette it was felt to pass without resistance more deeply than the previously ascertained depth of the uterus would warrant. Upon investigation the tip of the curette could be plainly felt through the abdominal wall above. Appreciating that I had accidently perforated the uterus with the curette all intrauterine instrumentation was discontinued, the torn cervix was repaired with an ample os, the uterus was lightly packed with iodoform gauze, and the suspension was proceeded with. When the abdomen was opened a valvular perforation of about ¾ inch in length was found near the left cornua in the fundus. There was a clearly defined atrophic area or thin spot in the uterine wall at the point of puncture. Two fine sutures of plain catgut closed the perforation satisfactorily. The usual ventro-suspension, after the method of Howard Kelly, was then done; and the patient returned to her bed in good condition. She made a rapid and entirely uneventful and satisfactory recovery. Though this occurred many years ago, and our opinions were not so settled in regard to the necessity for opening the abdomen in such cases as they are at present, I should not even then have opened this patient's abdomen for the closure of the perforation had it not previously been determined to do so for the ventro-suspension of the uterus. It will, I believe, be conceded at this time that such a proceeding would be distinctly unnecessary and mischievous in any simple uncomplicated uterine perforation, such as this, and very few surgeons would now sanction it.

CASE 2. Miss B., aged 26, in good general health, but had always suffered from intense dysmenorrhœa. The pain was so severe as to compel her to go to bed for four to six days at each period, and she was usually unable to follow her occupation of a school teacher for about a week of each month.

Upon examination I found a sharply anteflexed uterus with a conical neck, a pin hole os, and a cervical canal through which I was unable to pass the finest probe. I advised dilation and curettement of the uterine canal, the performance of which under ether I found most difficult. Even with the cervix steadied with a volsellum forceps I found it difficult to introduce a small sound into the uterine canal beyond the point of flexure. In the attempt to divide this stricture with a probe-pointed bistoury and subsequently dilate it with the fine-pointed intrauterine dressing forceps, I made a perforation through the posterior wall of the cervix at the point of flexure which I quickly recognized and upon investigation believed to be outside of the peritoneal cavity but into the connective tissue space between the vault of the vagina and the peritoneum. The perforation was a small one and at last, by carefully hugging the anterior wall I succeeded in getting the dilators beyond the constriction and the perforation, and I secured a satisfactory dilation and straightening of the uterine canal. The uterine cavity was rather firmly packed with gauze and the patient put to bed. She had much pain and backache and some slight rise of temperature during the first few days of her recovery, which, however, was ultimately quite satisfactory and complete.

CASE 3. Miss C., aged 19. I was called to come in haste to the hospital, the operating room nurse telling me that in an operation for curettement for an incomplete abortion, an accidental perforation of the uterus was thought to have been made. On reaching the hospital the physician who was operating told me he thought he had perforated the uterus, and he feared he had injured the intestine.

The patient was in collapse, with shallow sighing respirations and a weak, thready, and irregular pulse of about 160, and receiving salt solution by hypodermoclysis. Assuring myself that no doubt existed about the perforation and the necessity for immediate and radical action, hands and instruments were sterilized and the abdomen was quickly opened. Some blood, though not a large amount, was found in the abdominal cavity, and the small 3½ inch uterus was found to have a ragged hole in its fundus reaching almost from horn to horn. This was rapidly closed by tier sutures of catgut, and the peritoneum was stitched over all. A long loop of small intestine was found entirely detached from its mesentery. The free lacerated border of the mesentery presented the aspect of a long-thickened hæmatoma, the blood-vessels apparently had retracted between the peritoneal leaflets and, after filling this space, had ceased active bleeding; for there were no bleeding points of importance to be found anywhere during the operation. As already stated, there was not a large amount of blood in the abdominal cavity; not nearly so much as I have frequently seen in operations for a ruptured ectopic pregnancy. The ragged border of the torn mesentery was whipped over with a continuous stitch of plain catgut, one or two oozing points were ligated, and it was dropped. The detached loop of small intestine was clamped and resected, and an entero-enterostomy after the method of Cornell was made, the proximal end being high up in the jejunum. The abdominal cavity was flushed with hot salt solution, and the wound was closed with the abdomen filled with the hot solution. The patient's reaction from the operation was steady and satisfactory till the second day, when after taking a little cold water by mouth, she had a very severe and alarming attack of acute gastric dilation, which, however, yielded to postural treatment, bicarbonate of soda solution, etc. After this she went on to rapid and complete recovery, leaving the hospital in four weeks, well nourished and with no symptoms of serious digestive disturbance, though it was found that *six and one-half feet of small bowel had been removed.* To me the remarkable feature of this case was the surprisingly small hæmorrhage from so extensive an injury to such vascular organs. I presume it can be accounted for by the character of the force employed and from the fact that the detachment was notably so close to the intestinal tube that the serous covering *was stripped from the intestine itself*, and the blood-vessels were torn away at a point where they were smallest. The ultimate effect of so great a loss of small intestine upon the digestion, assimilation, and nutrition of the patient caused some anxiety, but no bad results of any kind supervened. With the history of Dr. Axel Werelius' case before us,[1] it is probable that no serious consequences need be expected to follow. In Werelius' case "Twelve feet of intestine were removed and the uterus had been perforated seven times. The patient subsequently went through two pregnancies. She is in excellent health."

These constitute all of the cases of perforation of the uterus with which I have had personal experience; but a woman, formerly my patient, suffered a ruptured vagina in an effort to detach an adherent placenta through which 18 inches of the sigmoid flexure and descending colon were pulled and detached from the blood supply. An operation was done under most unfavorable circumstances in the country by a competent surgeon. She died within a few hours.

Another patient was being curetted in this city by a physician, since dead. An advanced pregnancy and incomplete abortion furnished the

[1] Heineck, Surg., Gyn. and Obs., vol. 7, No. 4, p. 435.

motive. The uterus was perforated with the curette and placenta forceps and the intestine was drawn down through the rent into the vagina. An immediate abdominal section was performed by the operator, the rent in the uterus was closed, the fœtus removed from the abdominal cavity, and the patient made an excellent recovery.

As is stated in the second paragraph of this article, the better technique of modern abdominal operations, particularly of intestinal anastomoses, should improve the results in all such operations for uterine perforation.

In Heineck's tabulated report of 160 cases from 1895 to 1907, for example, there are sixteen cases in which damaged intestine was resected and anastomosis was done, of which seven died and nine recovered; a proportion of about 56 per cent of recoveries to 44 per cent of deaths. Making due allowance for the probability that more of the successful than of the unsuccessful cases have been reported, it is yet certainly indicated by these figures that the results in such operations are now vastly better than could have been possible ten or twenty years ago. Furthermore, it is reasonable to expect that with still better methods for entero-enterostomy, and particularly with the wider and more general diffusion of knowledge and skill along this line by surgeons, the results may be further improved.

Werelius' record of his case is remarkable in that, under the circumstances, he found the condition of his patient to be astonishingly good, when he saw her several hours after so severe an injury. *He found relatively little blood in the abdominal cavity and no bleeding of consequence from the more than twelve feet of torn mesentery.*

His experience is so exactly duplicated in this latter particular by my own that it may fairly be looked upon as a more than probable result of such injuries produced by such means. He, too, noted the detachment of the serosa from the small intestine, and I feel assured that my theory in explanation of the small amount of hæmorrhage, and of its arrest must be correct; that is, that the vessels were torn at their point of least caliber and greatest contractility. Their contraction and retraction between the lamina of the mesentery and the formation of the mesenteric hæmatoma made it possible to perform a life-saving intestinal anastomosis in each of these instances; an operation which must have been utterly impossible and futile without such effective physiologic hæmostasis.

PERFORATIONS OF THE UTERUS WITH INTESTINAL RESECTIONS FROM HEINECK'S TABLE

Case	Length Resected	Method of Anastomosis	Result
32*b*	5 inches	Murphy button	Died
34	31 inches	Murphy button	Recovered
41*a*	20 cm. (8 in.)	Not given	Recovered
48	26 inches	End to end anastomosis	Recovered
63	4 feet	Not given	Recovered *
76	18 inches	Not given	Died
103	6 inches	Murphy button	Recovered
107	30-40 cm. (11¾-15¾ in.)	Murphy button	Died
109	Not given	Murphy button	Recovered
118	2 meters 20 cm. (7 ft., 3 in.)	Circular enterorrhaphy	Died
119	Not given	Murphy button	Died
123	Not given	Harrington segmental rings	Recovered
130	5 inches	Murphy button	Died
133	40.5 cm. (16 in.)	Murphy button	Recovered
136	3 feet	Not given	Died
139	12 feet, 2 in.	Murphy button	Recovered *

Died, 7 (44%) Recovered, 9 (56%).

* Patient subsequently became pregnant — normal confinement.

SYMPHYSIOTOMY

A Report of a Fourth Case. Value of Author's Technique, Simple Bandage, Lateral Posture, and Early Getting Up [1]

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INTRODUCTION

Ever since symphysiotomy was brought before the world by Pinald and Harris, I have been a firm believer in its value, in elective cases. Ever since pubiotomy came into vogue, I have been awaiting its downfall. To-day, symphysiotomy is almost of the past and pubiotomy is waning, but I still have my old ideas about symphysiotomy, and the case here recorded, as well as the three cases previously reported, amply illustrates its simplicity and value when properly performed.

History of fourth case. Patient of Dr. Spratlin,

[1] For report of first two cases, see Transactions of Colorado State Medical Society for 1896; for report of third case, see Journal of A. M. A., April 23, 1898. In these three cases the same technique was employed as in the fourth case, but the patients were kept in the dorsal position and in bed longer. The first operation was performed by Dr. Wm. H. Buchtel assisted by me; the other two I performed.

Mrs. C., colored, age 27, married 10 years; 3 labors, duration about 3 days each; first two children born alive, third stillborn or died shortly after birth.

The patient was first seen 5 A. M. October 10, 1908. She gave a history of pains off and on since the membranes had ruptured, 13 days before. The pains had been severe for the last three days. On examination, the cervix was found nearly dilated, the head at the inlet in L. O. A. position.

Chloroform was begun at 6 A. M. The occiput was pulled down, rotated forward, and the forceps readily applied to the sides of the head; but forcible traction caused no descent.

The patient was then given a hypo. of morphine gr. ¼, hyosine gr. $\frac{1}{100}$ and strychnine gr. $\frac{1}{30}$ and hurried to Mercy Hospital in an auto.

Technique. The lower abdomen and vulva were shaved and rendered aseptic and the vagina wiped with sterile gauze.

The cervix was incised posteriorly so as to exclude it as a possible cause of the dystocia, the forceps again applied, and strong traction made with the patient in Walcher's position. There was no descent.

The forceps were left on. The patient was placed in an exaggerated lithotomy position. Three assistants were appointed; one to hold each leg, and regulate the separation of the joint by appropriate pressure, and one to retract the bladder and urethra from the pubes with a hard rubber sound. A vertical incision was made over the upper half of the front of the symphysis, and above it, long enough to permit the index finger to be passed behind the joint. Then with the finger as a guide, the joint and the subpubic ligament were cut from behind downward and forward. The joint was separated one and a half inches by relieving the pressure on the hips. The sound was removed from the bladder.

The head was delivered easily with the forceps; the bladder and urethra being carefully pushed up as traction was made.

The child finally gasped several times and the heart beat was present but respiration could not be established. The skull was found to be completely ossified, i. e., the usual sites of the anterior and posterior fontanelles were solid bone.

A hypo. of ergotol was given and the afterbirth delivered.

There were no lacerations of the vagina or vulva and normal urine was obtained from the bladder.

The cervix was repaired with plain catgut, and the incision over the pubes, with silkworm gut. The edges of the joint could not be brought in apposition until a hip-bandage of plain muslin was applied.

Puerperal record. The temperature on the afternoons of the first ten days varied from 98.8 to 99.8° F. The pulse was 110 on the second day, the rest of the time about 90. The patient was catheterized the first five days as she was unable to use the bedpan. Usually a drop of blood was found in the catheter after it was used, but there was none in the urine. The first ten days there was some pain and tenderness in the pubes, hips, and outer side of the left foot. Hypodermics of codein were given the first three days to relieve the pain. Partial paralysis of the foot, which she had also had after typhoid fever, continued for over a month. The stitches were removed from the pubic incision on the tenth day. The only discharge, on the dressing, was a little blood.

Posture. The head of the bed was raised six inches to favor vaginal drainage. As soon as the patient was put to bed she was allowed to lie on the side or the back with the limbs flexed or extended. The lateral position, with the legs flexed, seemed to favor the apposition of the edges of the joint. During the first three days the nurse assisted the patient in turning. On the fourth day the patient used the bedpan in the absence of the nurse. On the seventh day the patient was out of bed. On the eleventh, she walked about the hall with no abnormal motion of the joint and only slight bearing down; and on the fifteenth day she went home well, except for partial paralysis of the foot, which disappeared in a little over a month, as previously mentioned.

REPORT OF CASE OF ACCIDENTAL IMPLANTATION OF AN EPITHELIOMA—SHOULDER GIRDLE AMPUTATION

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While the implantation of cancerous tissue has frequently occurred at the time of operation and recurrence resulted in the local scar, such a distant implantation as described in the case about to be reported seems most striking.

The following most unfortunate case is, therefore, reported because of its pathological value:

Miss A. C., 48 years, came to me in January, 1908, with the history that as a child she had been badly burned by her clothes catching fire. Portions of the body, face, and neck were burned, as well as a large region on the right arm. The contractions of the scar flexed, and held the elbow so that little motion was possible. The scar tissue on the arm frequently gave way and ulcerated. The area had been often skin grafted without permanent benefit. For some months before coming to me there had been an ulceration on the forearm.

Examination: Well nourished and developed woman with numerous scars of an early burn. On the right forearm over the region of the supinator there was an ulcerated area lying in the scar tissue. It appeared to be simply a chronic ulcer. Over the tip of the elbow there was a heaping up of the epithelium in the scar, making almost a small horn. Examination otherwise negative.

On January 15th, under ether, the granulating area on the forearm was dissected out, a small margin of the surrounding tissue being taken with it. The base was dissected as free as possible of the scar tissue. Even then after the fibrous tissue of the floor of the ulcer had been removed there was very little bleeding. A flap of skin was then turned up from the abdominal wall and right breast. This flap was sutured to the wound in the forearm, leaving the pedicle to the breast. Dressings and swathe were arranged to hold the arm in position next to the body.

On January 21st, under ether, the pedicle was cut and the plastic completely sutured to the forearm. The area on the abdominal wall and breast was closed as well as possible. A wick was left in because of the discharge from the granulating area left by the plastic flap.

The plastic flap grew in place on the forearm though the edges sloughed a little.

She left the hospital on January 26th and was not seen again till February 24th. She was able to do herself what dressings had been necessary. The graft had healed nicely. From its lowest border an ulceration seemed to be extending down the forearm. Extensions caused by the formation of a nodule which eventually ulcerated.

A microscopic examination of the ulcerated tissue which had been removed at the first operation was then made. This showed that the ulcer was of the epitheliomatous type and of rapid growth.

The patient was then given a most thorough course of treatment with both radium and the X-ray. This treatment had no apparent effect upon the epithelioma which continued to spread over the forearm.

On April 10th, without any marked interval between the last of the X-ray treatments and the operation, the arm was amputated at the junction of the upper and middle thirds of the humerus. Immediately following the operation the temperature became elevated, the skin of the stump red, and blebs formed under the epidermis. The picture was very similar to that of a burn. A stitch or two was taken out, allowing the escape of a little cloudy serum, but no real pus. Large sloughs finally formed and the temperature came down to normal. After a rather long convalescence, the patient went home on May 19th with a small granulating area over the end of the stump.

I saw her again on September 7th, when she reported that the breast had been painful since May, and that it had ulcerated six weeks previously. An induration existed about the ulcer the size of a hen's egg. There was a tender gland in the axilla the size of a bean. The patient complained of a dry cough and pain in the right chest, which had been for some time sufficient to require morphia daily. Rales were present. Dr. W. H. Smith, who examined the chest for me, could find no definite signs of any extensions to the pleura.

On September 7th the stump of the upper extremity, with the breast and pectoral muscles, was amputated. The clavicle was divided and the outer portion, with the scapula, humerus, breast, and axillary contents, was removed. The growth in the breast had extended through the underlying structures to the chest wall and there were several enlarged glands in the axilla. In order to cover over the side of the thorax with skin, some of the skin scarred by the original burn had to be used. There was no shock to the operation. The scar tissue of the flap had very little circulation, and some of it became necrotic.

The convalescence was marked by the patient's great desire to die, having had much suffering and little for which to live. After a few days she was out of bed and about for a short time, and then remained constantly in bed. Signs of a consolidation appeared in the base of the right chest. Dr. W. H. Smith saw her again. It was considered that an epithelioma of the pleura was a probable explanation of the consolidation without rales. There was nothing characteristic in the pulse, temperature, or respiration, though the last was often very shallow. The condition remained the same till October 14th, when the patient began rapidly to fail and died on the next day.

The clinical points of interest may be summarized as follows:

1. The change of an ulcer which had been for years simple in character into an epithelioma of marked malignancy.

2. The breaking down of the tissues after an operation following directly upon numerous exposures to the X-ray and radium. Was it ordinary sepsis, or were the tissues so altered that they could not withstand the added irritation of an operation?

3. The direct inoculation of the breast with the epithelioma.

4. The case emphasizes in general the importance of removing cancer with an area of healthy tissue about it. It illustrates the possibility of spreading the disease by bringing the cancer in contact, by instruments or otherwise, with the wound.

PATHOLOGICAL REPORT BY E. E. TYZZER, M. D.

A histological study was made of tissue taken from the old ulceration of the forearm, the axillary lymphnodes, a sinus opening on to the surface of the skin of the axilla, and the breast at the site from which the flap was taken for the plastic operation.

In the tissue excised from the forearm there is a diffusely growing epidermoid cancer forming the floor of the ulceration and extending into the surrounding tissue. The tumor epithelium is irregular in its growth, and beyond a tendency to form whorls of concentrically arranged cells, presents no striking peculiarity. Areas of dense fibrous tissue evidently cicatricial in character occur in some portions of the excised tissue, and this is infiltrated with tumor epithelium arranged in long slender cords of cells. Throughout the connective tissue in the vicinity of the ulcerated surface there are numerous coarse, wavy, refractive fibrils of elastic tissue, which stain bluish with phosphotungistic acid hæmatoxylin. Many of these are found within masses of tumor epithelium. The epidermis at the margin of the ulceration is much thickened and irregular processes extend into the papillary layer of the skin. The germinative layer presents in certain areas atypical and degenerating cells. The ducts of the sweat glands show considerable hyperplasia, and are distinguished at a considerable distance from the surface although they are mingled with the tumor.

Great numbers of plasma cells are found in the tissue around the ulcerated surface.

The axillary lymphnodes removed at the time of the shoulder girdle amputation are invaded, and are replaced either wholly or in part by the tumor. Some of the glands contain a rounded encapsulated mass of tumor epithelium, of which only a thin peripheral layer has remained alive. The interior is composed of cornified epithelium, in appearance hyaline, and arranged in concentric layers and whorls. Such masses resemble somewhat sebaceous cysts, but at some point or other the tumor epithelium is found growing through the capsule into the surrounding tissue.

Sections of the tissue taken from about the opening of a sinus in the axilla show involvement of the corium and of the subcutaneous tissue at considerable distance from the sinus. Cystic dilatations of the sweat glands are present, and the tumor is found encroaching upon the ducts in places.

The tissue which was later on taken from the breast, at the site from which the flap was severed at the completion of the plastic operation, is infiltrated with epidermoid carcinoma identical in character with that found on the forearm. At the surface the masses of tumor epithelium are mingled with vascular connective tissue, in certain areas of which are collections of plasma cells. The fat, the mammary gland, and the voluntary muscles are invaded. The tumor epithelium not infrequently grows into the muscle fibres. In some cases the latter show hyaline degeneration, in others atrophy.

The evidence derived from the histological study of the preparations from this case indicates that an epidermoid cancer which originated in an old cicatrix on the arm was artificially implanted in the breast. From the nature of the operation performed it is apparent that a freshly made surface of cancer-involved tissue was applied to a fresh surface of normal tissue so that the most favorable conditions possible were furnished for the implantation of the tumor on the latter. Whether the cancer epithelium grew into the applied flap and was left in part in the stump when the flap was severed, or whether it was implanted directly upon the surface which could not be completely closed in beneath the flap, would depend largely upon the manner in which the surfaces were applied and is of no great importance.

A RAPID INTERLOCKING SUTURE

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Along with the brilliant results obtained in modern gastroenteric surgery there has always been a spirit of unrest in regard to an ideal method of intestinal anastomosis. In order to be ideal, a technique has to be rapid, simple of execution, and absolutely reliable under the most adverse conditions.

The nearest to the ideal seems to be a suture of the so-called interlocking type, where the sutures, though interrupted when inserted, form a continuous chain and are so placed that no spaces are left between the individual sutures through which leakage can occur.

The one described by Turck [1] is a mattress suture in which each succeeding suture is placed partly within the preceding one before the suture inserted first is tied. This is undoubtedly one of the best of its type, but it has the objection of having a confusing array of suture ends and necessitates almost microscopical suturing under trying conditions which tend to hinder its usefulness in cases where time is the prime factor to be considered.

The method described by Suggs [2] of using a two-eyed needle, one eye of which has to be threaded at the field of operation after it has once been passed through the wall of the gut, is rather an irksome procedure, especially if one is pressed for time. This latter technique has the advantage over the former in one respect, that is, the number of times the needle has to be passed is proportionally less, about as 3 is to 4.

To obviate the difficulties and objections one has to contend with in the sutures now in use and to make a distinct advance over the regular continuous or running types, the following suture is presented with the hope that by its simplicity, rapidity of operation, and versatility of uses it will make its own claim for recognition.

No special instruments are necessary, only several self-threading, calyx-eyed needles and a spool of Pagenstecher celloidin linen thread or plain silk (preferably the former). These are all that are required besides the regular instrument table outfit. The needle used had better be of the long, round, half curved kind which is easier to handle, and the suture material should be wound on a spool in one continuous length of from ten to twelve yards.

[1] Annals of Surgery, Dec., 1908.
[2] Annals of Surgery, April, 1909, page 590.

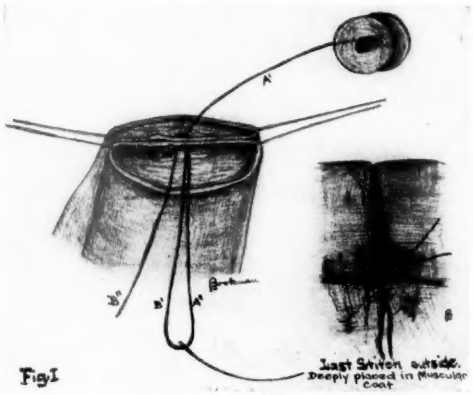


Fig. 1

For convenience of description this suture is shown in use as a modified Connell suture in an end to end anastomosis (Fig. 1).

After the bowel has been resected the cut ends are caught in traction sutures so that the mesenteric triangle is situated about one-half to three-fourths of an inch inside the left traction suture as in Fig. 1. When suturing from left to right the spool is kept to the *right* of the operator; when suturing from right to left the spool is kept on the *left*.

The needle is now threaded and passed through all the coats of the intestine about one-eighth to one-fourth of an inch from the cut edge and close to the left traction suture. This first stitch is made as a single suture *a*, the needle is now unthreaded or another threaded by an assistant, on the suture material running from the spool, about five inches from the point of insertion of the first stitch *b*, this needle carries a loop through the walls of gut with it. The component limbs of this loop, B′ and A″ are generally twisted one turn about each other in their passage through the tissues, the index and middle fingers of the right hand are now hooked into this loop *e* and B′, the continuation of B″ found — if B′ is not intertwined with A″ a turn of the wrist *f*, will bring this about. With the index finger and thumb still grasping B′ the needle is now cut away, and an assistant holds A″ loosely to one side *g*. B″ and B′ are now tied snugly not too tightly, *h* and *i*, and the ends cut away. The suture material from the spool A′–A″ is found to pass directly through the right corner of

the mattress suture just placed, *i j*, and the end A″ becomes B″ in reference to the continuation of the next suture ot the chain. It will be seen that each mattress suture interlocks with the one on either side of it, forming a continuous chain of stitches *k*.

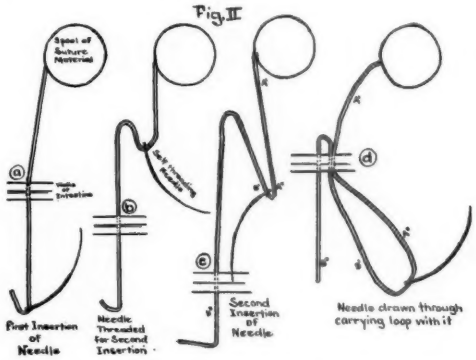


Fig. II
Spool of Sutural Material
First Insertion of Needle
Needle Threaded for Second Insertion
Second Insertion of Needle
Needle drawn through carrying loop with it

This procedure is continued to the traction suture which may be left in place and the chain of sutures made totally disregarding it. When the so-called "turn" is reached and the cut ends uppermost remain to be sutured together, the spool is placed on the left side of the operator and the steps pursued as before, the edges of the gut inverting with the advancing suture line.

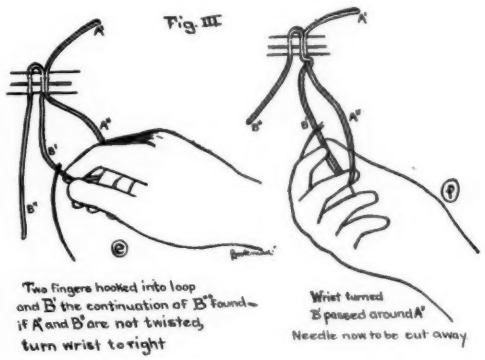


Fig. III
Two fingers hooked into loop and B' the continuation of B" found — if A and B' are not twisted, turn wrist to right
Wrist turned B passed around A'
Needle now to be cut away

When it becomes impossible to tie the knots in the lumen on the gut, the long thread is withdrawn from the suture last placed and the remaining one-eighth of an inch of unapproximated intestine is closed by a deeply placed sero-muscular purse-string suture (Fig. 1), this is very easily executed as the edges are already inverted. This last suture completes the anastomosis, but if any doubt exists as to its stability, or to make assurance doubly sure, a short chain of deeply placed sero-muscular interlocking sutures may be placed over this apparently weak spot; the extremities of this sero-muscular line overlapping the ends of the penetrating chain.

This last procedure closes over and virtually seals the last unapposed portion of the anastomosis, thus creating an absolutely air and fluid tight "joint," through which leakage is impossible. Traction sutures are now removed by cutting one end short and drawing the other out of the suture line, the mesenteric edges are united and all intestinal clamps are removed.

It will be seen that by this method there are no spaces between the mattress sutures and no puckering of the edges through which by any chance some of the intestinal contents may escape. The inversion of the edges is perfect, the cut edges, as

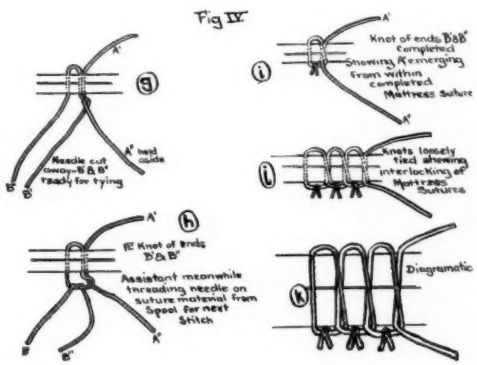


Fig IV
Knot of ends B&B' completed showing A emerging from within completed Mattress Suture
Needle cut away — B & B' ready for tying
A' held aside
Knots loosely tied showing interlocking of Mattress Sutures
1st Knot of ends B & B'
Assistant meanwhile threading needle on suture material from Spool for next Stitch
Diagramatic

stated before, inverting with the advancing suture line, and if all the sutures are snugly tied, none of the suture material of the penetrating sutures is visible, thus creating a minimum cause for the formation of adhesions. The sero-muscular sutures, parts of which are visible, are only a few in number, if used at all, and are placed near the mesenteric attachment and are tucked out of harm's way.

While this method of suturing has been described in relation to entero-anastomosis its advantages in gastroenterostomy are evident in respect to time, facility of application, insurance against leakage, and last but not least important, the prevention of the pursing caused by the continuous sutures if placed tight enough to prevent leakage, and the continued preservation of the newly made stoma.

After the excision of a peptic ulcer, to close the edges of the gap its use will be appreciated,

as it will be in gastrostomy, in pyloroplasty, and in the closure of "blind ends" of gut. Its advantages are obvious in operations on the biliary tract where drainage is not required, also in operations on the kidney, pelvis, ureters and bladder, and for various fistulæ. Its adaptation suggests itself in the repair of injuries to blood vessels, if used on the adventitia and muscular coat as a semi-penetrating suture, also in aneurismorrhaphy, where the close coaptation of the intima is so important for the preservation of perfect and ideal hæmostasis.

This suture will also be found to be of service in the closure of the pharyngeal wall after a complete laryngectomy and in uniting the edges of the pleura should it be injured in exploring the dome of the liver. In doing a colostomy or enterostomy the operation may be completed safely in one stage without fear of contaminating the peritoneal cavity, if the visceral peritoneum is sewn to the parietal peritoneum in this matter before the gut is opened.

Where only a few stitches are required and the suture material used is catgut it is better not to use a self-threading needle, lest it tear the strand, but to thread a number of needles on the catgut beforehand and slide them along as required.

In conclusion it may be stated that the actual time required in the use of this suture for various purposes will be found to be considerably less than the time taken by other methods where re-enforcing layers are required. After a few stitches are placed the few steps necessary become almost automatic and the rapidity with which the operation is completed will be found to be an agreeable surprise, in addition to the satisfaction that an absolute non-leaking anastomosis has been obtained.

A NEW TUBE AND VALVE DEVICE FOR EXPANDING COLLAPSED LUNG

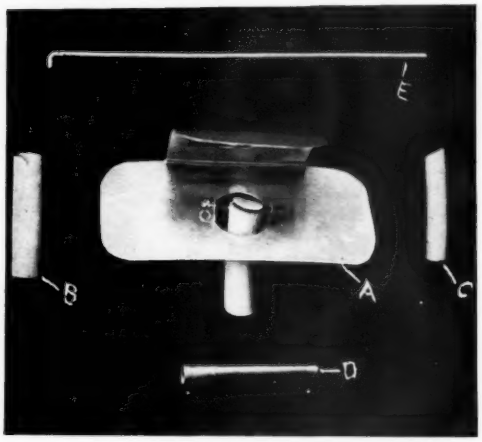
By J. SEDGWICK DEAN, M. D.
Surgeon-in-chief Donald MacLean Memorial Hospital Wheatland, Iowa

The device consists of an *ordinary soft rubber drainage tube* of any size desired, and a *valve* made of oiled silk, any flexible waterproof material or of aluminum; a *flexible shield* for protecting the valve from interference from the external dressing and to hold the tube in a pivotal manner, thus maintaining it in the chest wall without bending or causing lateral pressure on the tissue. The elastic wing of the shield under body bandage with appropriate pressure, holds the shield in coaptation to the chest, both in inspiration and expiration. A secondary specially devised bandage, over the base of the shield prevents lateral movement, hence the combination of the pivotal hanging of the tube, the elastic wing of the shield under appropriate pressure, and the secondary body bandage maintains the tube in absolutely perfect position, leaving the patient free to move as he pleases, in bed or out.

The manner of attaching the tube to the shield also prevents the discharge from regaining access to the pleura, as it at once drops away from the end of the tube as soon as it leaves the pleural cavity.

Air is prevented from gaining access to the pleura around the drainage tube by winding the distal end of the tube with 5 per cent iodoform gauze. It does not need to fit the opening overly tight to serve this purpose in practice.

As to the valve, in cases of moderate collapse, use the tube with the end cut at a right angle as shown at (*A*). This valve closes instantly at the beginning of inspiration, and enables the full atmospheric pressure to act intra lung. While negative pressure is ordinarily understood, it is not produced within the pleural space by this method. Rarification in sufficient degree is produced to cause rapid expansion of the lung. I may appropriately say at this point if normal negative pressure is an essential to lung expansion, then heavy dressing, Wolff's bottles or blowing through constricted tubes would never cause expansion. Practically, we all know that many cases of moderate severity have recovered by these methods, although recovery is protracted, and expansion is often imperfect. With this device, as soon as inspiration begins, the air is prevented from entering the pleural space and the action of the muscles causing chest expansion, immediately produce rarification of the air within the pleural space, thus causing a relatively negative pressure sufficient to produce rapid expansion of the collapsed lung; further as the lung expands, residual



air, if I may so express myself, within the pleural space, become less and less, until finally when the lung becomes fully expanded, as it will in a short time, normal negative pressure is obtained. So that we see that *practically* this device does all that any suction apparatus can do at less expense, with less trouble, and leaves the patient ambulatory. It needs no watching on the part of the attendant, as the patient can hear the valve close on the beginning of each inspiration.

If the operation has been performed properly, with the drainage tube at *the most dependent point*, the pleural space will be maintained as free from discharge as is requisite for prompt healing.

Another advantage is that with the guide associated with this device (*E*) in illustration, the exact thickness of the chest wall can be ascertained, and with the tube absolutely fixed, a tube equal in length to the exact thickness of the chest wall, can be used, so that as the lung expands, if the entrance of the tube is a little above the fissure between the lobes there will be nothing to interfere with complete expansion of the upper lobe of the left lung, or the middle lobe of the right lung, and thus avoiding adhesions above the drainage opening as the margin of the lobe presses downward in expansion.

If the lung is allowed to remain quiescent at this point through interference with the drainage tube protruding into the pleural space, then an adhesion will surely form and a sinus will remain between the upper and lower lobe in the left lung, and between the middle and lower lobe in the right lung. I believe this condition is often overlooked and is a potent cause for the long continuance of many cases.

The tube marked (*B*) illustrates the method of nicking the tube to permit the entrance of air under the valve after closing.

This tube should be used the first 24 hours after operation, in old cases with very large effusion, for the purpose of reducing intra lung atmospheric pressure sufficiently below normal to prevent too rapid expansion at first, with the attending danger of lung congestion. But remember the lung must be kept moving in order to avoid adhesions. The size of the nick in the tube will accurately gauge the amount of the pressure used.

Finally,

1. This device can be thoroughly sterilized.
2. It maintains the tube in perfect position.
3. It prevents entrance of air around the tube without the use of any flange device with its attending danger of maceration of tissue.
4. It avoids any possibility of discharge being sucked back into the pleural space with the attending danger of reinfection.
5. By using the tubes cut in the manner illustrated by (*A*, *B*, and *C*) intra lung atmospheric pressure is entirely under control of the attending physician.
6. The form and construction of the shield with the special manner of bandaging, maintains all in perfect position, leaving the case ambulatory if so desired.
7. The valve should be removed as soon as the lung is fully expanded, and dressing continued with tube and shield alone.
8. Be sure the lung is free at the first operation, so it *can* expand.
9. (D) in illustration represents the instrument for making new valves.

A CASE OF SARCOMA OF THE CÆCUM

By C. A. HAMANN, M. D., Cleveland, Ohio
Visiting Surgeon to Charity, City, and Mt. Sinai Hospitals

The fact that sarcoma of the large intestine is comparatively rare has induced me to report briefly the following case:

Mr. H., aged 24 yrs., a farmer by occupation, referred by Dr. C. H. Tanner. The patient, a moderately well nourished man, had lost perhaps 25 lbs. in weight in the last two months. He complained of loss of appetite and abdominal pain. Within the last three or four weeks he had a couple of attacks of temporary obstruction of the bowels, which were relieved by cathartics and enemas. No blood had been passed per rectum.

Physical examination. In the right iliac fossa was a somewhat painful, solid tumor, about the size of a small orange, which was very freely movable; one could displace it into the pelvis and almost to the costal margin, as well as laterally. No other tumors or enlarged glands were found.

Operation. Incision through right rectus abdominis. The tumor was found to be on the inside of the cæcum near the ileocæcal junction; the outer coats of the bowel were not at all involved in the mass. The cæcum was unusually movable, being provided with a mesocæcum, and could easily be delivered, along with most of the ascending colon, from the abdominal cavity.

The cæcum, part of the ascending colon and about an inch of the ileum were resected, the ends of the colon and ileum were closed with double rows of linen suture, and a lateral anastomosis established between the lower ileum and the ascending colon. Two or three enlarged retro-colic glands were removed.

Death occurred on the 4th day, from peritonitis.

Examination of specimen. On the inside of the cæcum, springing apparently from the submucosa, near the ileocæcal junction, is a bilobed, firm tumor, about 2½ inches in diameter. The surface is for the most part smooth, though there are a few irregularities.

Microscopical report (Dr. W. H. Rieger). Sections of the growth show it to be a very cellular one. The cells are very small, round, with a small amount of protoplasm and a large nucleus which stains deeply. There is very little intercellular substance. The blood-vessels have very thin walls, and in several areas non-striated muscle tissue infiltrated with tumor cells can be seen.

Diagnosis. Small round-celled sarcoma.

Corner and Fairbank in 1904 collected 175 cases of sarcoma of the intestinal tract (exclusive of those of mouth, pharynx, and anus). 20 of these are stated to have been in the ileocæcal region, 11 in the large intestine, 7 in the rectum, 14 in the œsophagus, 58 in the stomach and 65 in the small intestine. I have found 4 additional cases of sarcoma of the cæcum recorded since 1904. Gregoire in 1907 found that 82 cases of sarcoma of the small intestine had been recorded up to that time.

Sarcoma of cæcum.

All writers on the subject agree that sarcoma is much less common in the large intestine than in the small; the opposite is true of carcinoma, as is well known.

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A CASE OF PENETRATING WOUND OF THE ABDOMEN

By J. L. WILSON, M. D., Alexandria, Louisiana

Mrs. Annie M——. White, age 30, married, multipara, native of Louisiana.

Family History, good.

Personal History, good. Has always been healthy, with the exception of the diseases incident to childhood, and one miscarriage.

On July 25th, 1908, she was gored in the abdomen by a cow, the cow's horn penetrating the abdominal wall into the peritoneal cavity. The horn entered the abdominal wall about two inches below and to the right of the umbilicus entering through the rectus muscle on the right, lacerating and tearing its way through all the coats of the abdominal wall in an oblique direction and downward, making its exit through the left rectus muscle and about four inches below the umbilicus on the left side, producing a wound about six inches in length.

The accident occurred during the absence of her husband from home, there being no one at the house except her small children, and a negro man who chanced to be passing the house at the time. Observing her condition the negro went to her aid and with his soiled hands returned the intestines which had protruded from the abdominal cavity holding them in place until a physician could arrive, which required several hours.

Upon the arrival of the physician, Dr. D. K. Texada, of Boyce, La., he found that the case was serious and at once telephoned for an ambulance to come to her home and convey her to the Alexandria Sanitarium, a distance of fifteen miles.

The doctor in the meantime cleansed the wound as well as circumstances would admit and put several sutures in the abdominal wall, applied a sterile dressing until he could arrive at the Sanitarium. Upon her arrival at the sanitarium, at 12.30 A. M., I found her to be about three months pregnant. Examination of the abdomen and intestines under general anæsthesia revealed the lacerated penetrating wound of the abdominal wall, but fortunately no perforation of the intestines was found; the intestines were found to be contused, however, in places.

The wound was thoroughly cleansed, the lacerated edges were pared and sutures of silkworm gut were placed through the abdominal wall, bringing the great omentum well down to cover the intestines and inner surface of the wound, a simple steril dressing applied, and the patient carried to her room.

Prior to and immediately following the operation, the patient suffered with uterine and general abdominal pain, which was relieved by morphia. I was enabled by the use of an occasional dose of morphia or codeia to keep my patient comparatively free from pain and avert an abortion.

From the time of the operation for nearly three days the patient suffered from almost incessant nausea and vomiting of quantities of green fluid. On the afternoon of the third day she vomited a large quantity of yellow fluid with a distinct fœcal odor. On the third day she had hiccough and did not feel well at all. I then ordered a copious soap and water enema which produced a copious evacuation of the bowels, when the nausea and vomiting ceased. From this time on the patient was able to take liquid food by the mouth. Prior to the cessation of nausea she was nourished by rectum and was given normal saline solution at stated intervals. The minimum temperature for the first four days was 100 F., and the maximum temperature was 101 F.

At the end of 72 hours the wound was found to be sloughing, the omentum, however, walled off the intestinal contents. The sutures were removed and the wound coapted with adhesive plaster.

At the end of three weeks, an extraperitoneal abscess was found and evacuated.

She was discharged from the Sanitarium on August 30th, 1908, practically well, and in the course of a few days the wound was completely healed. The pregnancy progressed uninterruptedly to full term, and on January 25th, 1909, she gave birth to a nine pound girl, fully developed and normal in every way.

Summary. In the first place the patient was subjected to unusual danger of infection from long delay in getting medical aid and proper care of the wound.

In the second place the pregnancy complicated matters very much, the gravid uterus interfering very much with proper co-aptation and union of the abdominal wound, as well as increasing the danger of ventral hernia very much.

I wish to call especial attention to the great protection afforded the general peritoneal cavity by the omentum having perfectly shut it off from infection, and in this way no doubt saved the life of my patient.

The nausea and persistent vomiting in this case was no doubt due to an intestinal obstruction, caused by trauma to the intestines.

TRANSACTIONS OF SOCIETIES

CHICAGO MEDICAL AND CHICAGO SURGICAL SOCIETIES

A JOINT MEETING OF THESE SOCIETIES WAS HELD MAY 5, 1909, WITH DR. A. E. HALSTEAD, PRESIDENT OF THE LATTER SOCIETY, IN THE CHAIR

DR. DUDLEY P. ALLEN, of Cleveland, Ohio, read a paper, by invitation, entitled "Late Manifestations of Intracranial Hæmorrhage of Traumatic Origin." (See p. 299.)

DISCUSSION

DR. A. J. OCHSNER was asked to open the discussion. He said:

This very thorough, comprehensive, and scholarly paper is one of the best efforts we have had before this Society. The fact that the condition described is a rare one makes it none the less interesting and practical. The fact that these late conditions exist so rarely makes their recognition exceedingly difficult, and one may easily overlook the condition. The fact that this condition may come on so late, and after apparently a slight injury, makes it again difficult to recognize.

In my own experience I have encountered but one typical case of subdural clot. The patient was a cattle owner in Montana, who was struck across the head with a chair by a cattle thief. He was knocked down. He rose at once, walked to his home, and was apparently well for two months, at the end of which time he began to suffer from headaches. This condition came on so late after the injury that at first it was not attributed to the proper cause, and it was only after two years had elapsed that the patient became a raving maniac, and was paralyzed on the right side. He could not speak, but he made the noises of a maniac, when it occurred to the people in the mountains that possibly the condition might have some relation to the primary injury. He was brought to Chicago; we trephined, and what we estimated to be eight ounces of a dark sanguineous fluid was removed. The left frontal lobe had been pushed to the right, so that the condition seemed hopeless; but within twenty-four hours the patient began to speak, and within two months he was apparently normal. I have not seen a similar case since then. This case was seen in 1891. The patient was suffering from pressure, and that pressure was relieved.

It seems to me, having had this subject placed before us so clearly to-night by Dr. Allen, it must prove to be of tremendous value to us.

Regarding bone grafting, I would say that I have made many observations, having been an assistant to Professor Senn for a number of years, who made many operations upon the skull, and implanted bone he had removed constantly. I am sure Dr. Allen is right in his demonstration, not only in the dog, but in the human subject, that these implantations will grow and form true bone, provided they remain uninfected.

DR. JOHN B. MURPHY: Dr. Allen has given us a very lucid presentation of the late manifestations resultant from intracranial hæmorrhage or liptomeningitis of traumatic origin. When we note the number of cerebral and paracerebral hæmorrhages that occur in adult life without trauma, it should be expected that we would have a very much greater number of hæmorrhages as a sequence of trauma, considering the frequency with which the head is injured and the apparent ease with which the intracranial vessels are ruptured. Notwithstanding the weakness of these intracranial vessels, hæmorrhages from trauma of mild and even of great severity, are comparatively rare. It is probable that the number is greater than we have heretofore suspected, because we have not interpreted the etiologic factors of pain, nervous irritability, nausea, vomiting, slowness of speech, disturbances of vision, etc. Indeed, this can well be assumed from the statements presented by Dr. Allen to-night.

In the history, the text-books, and in the current literature of intracranial hæmorrhages the types chiefly alluded to are those occurring on the surface, or the extradural, and not the intracerebral. The types of basal, subarachnoid, diffuse, and local, have been neglected.

The locations of a hæmorrhage following a trauma are essentially two — at the point of the trauma and diametrically opposite the point of trauma, whether they be caused by blows on the parietal, temporal, vertex, or basal areas. In the

order of frequency of their occurrence, where the preponderance of force is on the vertex down to the orbital, zygomatic and occipital levels, the hæmorrhage is extradural, subdural, subarachnoid, or cerebral. When the preponderance of force is at the base, as from blows with heavy, blunt objects on the vertex, or falling on the head, the order of frequency is, subdural, subarachnoid, cerebral, and rarely extradural, owing to the fact that the dura is so firmly bound to the bone at the base.

The essential sources of hæmorrhage from injuries to the vertex are the middle meningeal artery, the veins of Santorini, and the dural sinuses. Primary intracranial pressure from hæmorrhages from the sinuses never occurs, as the blood in the sinuses has scarcely a plus pressure, though it may cause a subsequent serous transudation by its physical presence and this fluid may have a high tension.

Extradural clots are not uncommon in extensive traumas without any external evidence of injury to the head. The traumatic subdural hæmorrhages are not infrequently bilateral, the so-called hæmorrhages by *contra coup*. They are the most dangerous in type, as the hæmorrhage on the opposite side from the trauma is so frequently overlooked, and the unconsciousnes which continues after operating on the side of the trauma is attributed to intracerebral hæmorrhage when in reality it is a subdural or subarachnoid hæmorrhage of the opposite side.

In the order of frequency of hæmorrhages from the middle meningeal, that in the middle fossa is the most common, the posterior second, and the anterior third, corresponding to the respective branches of the middle meningeal artery.

The quantity of blood that may escape from the vessel from middle meningeal ruptures, either extra- or subdural, varies greatly and may reach six to seven ounces. The immediate effect of the hæmorrhage depends not so much on the quantity as on (1) the rapidity of the formation of the clot; (2) the tension or intracanial pressure produced; (3) the conformation of the clot; and, (4) the location of the clot on particular zones of the cortex. A large quantity of blood slowly admitted permits the brain to accommodate itself to the increasing pressure. A large quantity diffusely spread over the surface of the brain is less destructive than a small, concentrated, deep clot. It is the slow type of hæmorrhage following slight trauma and where the blood is diffusely distributed that Dr. Allen has particularly emphasized in his paper, and which is so commonly overlooked as an etiological factor of the cerebral symptoms.

The physics of cerebral hæmorrhage and the pressure produced therefrom is very favorable to surgical intervention. It is not the physics of hydrostatics; that is, the pressure produced by the blood is not as great a short time after it escapes as would be the pressure on an equal quantity of water communicating with a small inlet carrying a hydraulic pressure equal to that of the middle meningeal artery. This is due to the fact that the blood coagulates and does not press equally in all directions when the coagulation is accomplished. When the coagulation is complete and the hæmorrhage has stopped, unless the quantity is very great the brain fairly well adapts itself to it when it is extra-arachnoidal or extradural.

It is refreshing to have Dr. Allen so forcefully emphasizing the late manifestations of hæmorrhage at a time when a very large proportion of the early and even fatal manifestations of hæmorrhage are overlooked; if not overlooked, inefficiently treated. The differential symptoms between concussion, "commotion," and hæmorrhage do not appear to be appreciated. Even those with the important interval of consciousness between the shock and the cerebral compression from hæmorrhage, are not diagnosed. The few intervals of local focal irritation preceding the stupor should be observed. The deviation in the pupils, the primary contraction on the side of the hæmorrhage, with a rapid secondary dilatation, should be noted. The choked disk, usually most marked on the side of the blood accumulation in the very early stage, should be looked for as a sign both of pressure and location.

As the middle meningeal artery is the most common source of blood supply in extradural and subdural hæmorrhages, its control immediately after the trauma is of prime importance as a life-saving procedure. Cushing's estimate of 90 per cent mortality from middle meningeal hæmorrhage, meaning, I take it, of the severe middle meningeal hæmorrhages *without operation*, is probably correct; while *with operation* the mortality is reduced to about 30 per cent. The 30 per cent of mortality in operation is principally due to the delay in the procedure or faulty technique based on the surgery of other portions of the body and lack of practical experience in brain surgery.

What is this mortality due to? (1) to intracerebral pressure interfering with the functions of the medulla; (2) to lacerations and destructions of the cortex; (3) to œdema and intracerebral pressure secondary to the trauma and primary hæmorrhage; (4) to sepsis of hæmatogenous or of oral or faucial origin, as many of the basal

fractures are compound into the ear, nose, and mouth. Sixty per cent of the mortality occurs within the first 24 hours, which is practically all due to the immediate cerebral compression from the hæmorrhage.

How can this mortality be avoided? The middle meningeal artery, the source of this hæmorrhage, is a terminal artery originating from the internal maxillary, the largest division of the external carotid. The technique followed and advised in the control of this hæmorrhage in the works on surgery, both ancient and modern, has been to trephine, find the bleeding point, close it or compress it, and remove the clot. It seems to me odd that in the most recent and advanced text-books this obsolete scheme of attack should still be the only one mentioned. We have taught for years that in suspected middle meningeal hæmorrhages the first step should be the temporary or permanent ligation of the external carotid just behind the angle of the jaw. This at once stops the hæmorrhage, causes a cessation in the advancement of intracranial pressure, and gives opportunity to make the necessary preparations for the removal of the clot. The operation can be performed with a simple surgical pocket case without anæsthetic, even without cocaine. After dividing the skin a scissors-spreading dissection may be made in 30 or 40 seconds to expose the external carotid artery above its occipital branch and permit of clamping it with forceps or throwing a ligature around it. Why this should not be mentioned as a primary procedure in all modern text-books is scarcely comprehensible. Ligation of the external carotid is mentioned in Von Bergman's Surgery as a means of controlling bleeding after opening the cranium, and it is condemned, and rightly so, because the bleeding is of other source than the middle meningeal artery. In place of waiting to transport a patient to a hospital, secure a surgeon, trephine the skull, and all of the manipulation that is necessary for this, with the blood continuing to increase in quantity and depress the brain even to a fatal degree, the hæmorrhage can all be stopped immediately by the average practitioner, and with the simplest armamentarium. If there is doubt as to which side is bleeding, both of the external carotids can be ligated with safety. This simple, safe, time-and life-saving procedure should be the first impulse of the medical attendant in every middle meningeal hæmorrhage. The common carotid should never be ligated for this purpose, not even temporarily. It may be temporarily compressed to suppress cerebral hæmorrhage, but it has been demonstrated experimentally and clinical experience has shown that even 8 minutes of complete occlusion may produce serious subsequent organic cerebral changes.

After the hæmorrhage has been controlled by the ligation of the external carotid the osteoplastic flap is certainly the better method for the removal of the clot and the subsequent comfort and safety of the patient. It requires a little more time than the submuscular excision of the bone, but not more than a few minutes, and the subsequent replacement of the flap, the avoidance of cerebral protrusions, and absence of depressions are less disfiguring with the osteoplastic than with the bone excision type of cranial opening.

In the removal of the clot when circumscribed, there is little if any difficulty. Where it is extensive and spread out, as it so many times is in the subdural and subarachnoid varieties, it requires the greatest care not to traumatize the cortex or lacerate new vessels, thereby causing additional hæmorrhage. When the external carotid has been ligated in middle meningeal hæmorrhages there is no occasion for searching for the bleeding point. Hæmorrhages from the edges of fractured bone in the base are not at all controlled by ligations of the external carotid. Here we have to resort to the tampon, or, better still, to wax or oil of spermaceti — "whale oil paraffin." This is an absorbable material. The coal oil paraffin should not be used as it is inabsorbable. This simple means of Victor Horsley of suppressing hæmorrhage from bone is not sufficiently used.

The operations for intracerebral hæmorrhages are giving better results than formerly, but they are still very discouraging, as the ganglion cells are destroyed by the laceration and tearing produced by the blood or by the continued compression before operation relieves the pressure. Spinal puncture a few hours after unconsciousness has, in some of the cases, a very decided relieving efiect both in the subdural and cortical varieties. The later spinal punctures often induce a very rapid absorption of the cerebrospinal fluid which aids in producing the continued compression after hæmorrhage. It is a well recognized fact in hydrothorax and hydrocele of the tunic avaginalis that a single aspiration not infrequently stops the secretion and causes absorption of the fluid.

This is beautifully illustrated in the case which I have to present to you to-night. This patient was operated for cerebral tumor many months ago by Dr. Schroeder, who is here. Following this he had an enormous protrusion extending 3 inches above the level of the cranium. His intracranial pressure appeared to be greatly increased; his choked disk continued, etc. On the suggestion of Dr. Church that we aspirate the

fluid and reduce the intracerebral pressure to make a more careful examination through the craniotomy opening, we drew off 7 drams of cerebrospinal fluid by lumbar puncture. This merely lessened the tension in the tumor but did not materially reduce its size. Within 48 hours after this aspiration absorption was so complete that there was a concavity to the depth of an inch where there had formerly been a protrusion of three inches. This was due to absorption or osmosis induced by the change of pressure in withdrawing a small quantity of fluid from the spine.

It is a well recognized fact in physics that definite pressures are most favorable for osmosis, and I believe it is this element more than anything else that favors the absorption of the hydrocele, thoracic, and meningeal fluids after puncture. The boy's vision has materially increased; his choked disc has receded; his optic atrophy is still present.

One point, I believe, should be emphasized, namely, compression in the unconsciousness following traumas. The œdema and swelling following a commotion of the intracerebral contents, can be and is relieved by a submuscular temporal or occipital decompression, as verified by examination of the choked disk, etc. If these patients with fractures and brain œdema and compression can be tided over a limited period of time they make good recoveries, provided they do not get an infection through fractures into the aural, oral, or nasal cavities. The skull acts on this œdematous tissue the same as a plaster cast acts on an acutely traumatized extremity. The swelling continues under and below the cast until it is split, when absorption suddenly, rapidly, and completely takes place. The same can be accomplished in the brain and should be resorted to in all these cases of unconsciousness. Decompression is therefore not only a vision-saving procedure, in the chronic cases, but a life-saving procedure in acute cerebral œdema and acute cerebral compressions from hæmorrrhage.

In Dr. Allen's chart here you have a splendid presentation of the facts connected with the secondary manifestations of trauma in the brain in which blood is in greater or lesser quantities present in the fluid removed. An analysis of these cases shows, first, that they are not pathologically in consonance with hæmorrhage in any other portion of the body, associated with or independent of the element of trauma; that they are in consonance with the chronic, traumatic, hæmorrhagic serous inflammations, and in noting the fact that all of these cases involve deposits beneath the dura and none extradural, that all of them are apparently circumscribed accumulations, and that all are blood stained at least, they appear to me to come under the category of circumscribed, chronic, traumatic inflammatory conditions; and it appears that the proper name for this pathologic condition would be "pachymeningitis hæmorrhagica circumscripta"; that it is the inflammatory element that plays the important rôle in the production of pressure and not the hæmorrhage seems quite clear. We have analogous hæmorrhagic inflammatory conditions in the knee joint and in the tunica vaginalis testis. That the element of pressure is the important one in the production of the immediate symptoms is also quite clear, as the cases appear to get immediate relief from the removal of the fluid, and their drainage institutes in these circumscribed, serous, subdural accumulations the same reaction that drainage does in the tunica vaginalis and in the knee joint. We are dealing in these cases, therefore, with traumatic, serous inflammatory conditions rather than with hæmorrhage.

I wish to congratulate Dr. Allen on his forceful presentation of his subject and the lucid arrangement of his charts.

DR. ARTHUR DEAN BEVAN: I have been much interested in Dr. Allen's presentation of this subject. It opens up a new field. I doubt very much whether there are half a dozen men here, besides Dr. Allen, who have had experience with cases similar to his own and the ones which he has collected from the literature.

I should like to say just a word as to the pathology of this group of cases as it impressed me. After hearing Dr. Allen's discussion and looking at his chart, we must be impressed with the fact that certainly in the cases in which the symptoms did not come on until 52 days or 8 or nine months after the injury that we cannot account for the symptoms from hæmorrhage alone, that is, a hæmorrhage which is directly the result of the trauma. What is the explanation? I believe that the explanation is, that we have here a pachymeningitis, a pathological process which is imposed upon the trauma. Have we any parallel of such a condition? Yes, we have. We have the well known condition of chronic hematocele involving the tunica vaginalis. We have a series of cases following injury of the tunica vaginalis in which immediately after the trauma there is a slight hæmorrhage. It may be of comparatively little moment. It is not absorbed. Within a few weeks there is another slight hæmorrhage, which is not absorbed. Within a short time there may be another hæmorrhage, and finally we have a considerable accumulation of blood and serum

within the tunica vaginalis, started, it is true, by the original trauma, but being in fact a traumatic hæmorrhagic inflammation of the tunica vaginalis and not purely a simple hæmorrhage alone.

I am quite impressed with the possibility that in those cases where we find symptoms developing eight months after the receipt of the head injury, or 52 days thereafter, we have pathologically a very similar condition, a pachymeningitis hæmorrhagica interna of traumatic origin. These cases collected by Dr. Allen are, with one or two exceptions, subdural. I think that fact must exclude the middle meningeal artery as a source of the hæmorrhage.

There is one point which I should like to add to the discussion from my own experience. I should like to say that sometimes where we have apparently very definite evidence of hæmorrhage from the middle meningeal artery, we find when we come to operate and expose the dura that the hæmorrhage is not from the middle meningeal. I have had one such case which I shall relate briefly.

A man of 50 was struck by a steel beam swung from a derrick, hitting him upon the side of the head, rendering him unconscious for a short time. He was brought to the hospital. He became conscious, and within two days became gradually drowsy. One side became paralyzed, and he became comatose. He presented a rather typical picture of a middle meningeal hæmorrhage. I was called in as consulting surgeon and operated upon the man on the side of the skull opposite to the paralysis. We exposed the usual area of the middle meningeal artery and found no blood between the dura and bone. We then divided the dura and found no blood beneath it. I then took a very blunt grooved director and introduced it in the motor area about opposite the arm center for a distance of three-quarters of an inch, and plum-colored blood, which had been poured out in the brain tissue for some time, ran along the track of the grooved director. A couple of grooved directors were inserted at the time, and possibly half an ounce or an ounce of this material escaped along the grooved director. A tube was introduced for drainage, and the patient cleared up immediately from the immediate effect of the operation. I want to say, however, that while he recovered from his paralysis his mentality afterwards was rather slow. One could almost see him think, and eventually this patient got a verdict of $35,000 for his injuries. I simply mention this case as one of the contingencies we must keep in view in these possible meningeal hæmorrhages.

Dr. S. C. Plummer: It seems to me, as the essayist remarked and as Dr. Murphy emphasized, the column stating the location of the hæmorrhage is very remarkable from the fact that in all of these cases, where the symptoms appeared after this long interval, the shortest interval being 14 days, the clot or collection of fluid was subdural. In no case where the symptoms came on so late was there an extradural clot or collection of fluid. When we stop to think of this, it can be explained on very obvious grounds.

If the hæmorrhage were extradural, it would, in all probability, be from a vessel so large that the symptoms would have appeared at an earlier period than 14 days. Moreover, if these late symptoms were not due to the hæmorrhage primarily, but to the fluid which was poured out as the result of irritation of the hæmorrhage, we would think theoretically that the conditions outside of the dura would not be favorable for such a pathological process; consequently it only seems natural, after all, that in these cases where the symptoms came on so late the lesion was invariably found inside the dura instead of outside of it.

There is one condition which, it seems to me, might be confused with subdural hæmorrhage coming on late or showing symptoms at a late period, and that is what Bollinger has described as a "late apoplexy." He claims that after a contusion of the brain, a degeneration of brain substance may take place, which may extend far beyond the limits of the original lesion. This is in the nature of a fatty degeneration or is identical with it, and accompanying this is a degeneration and weakening of the vessel walls. The vessel being itself weakened and having its support also taken away by the surrounding degeneration, ruptures at a period sometime after the original injury. This may be a number of days or even weeks or months. It would seem, however, in these cases, the symptoms, when they do come on, would come on rapidly, not gradually, as in many of the cases described to-night.

I remember one case which I thought came under this head. A man was struck in the temporal region in a railroad wreck; he received a slight wound, one-half or three-quarters of an inch in length, which divided a branch of the superficial temporal artery and necessitated its ligation. This wound healed promptly. Ten days afterward, while at his desk, he was suddenly attacked with what seemed to be cerebral apoplexy. He had all the symptoms of hemiplegia. He never recovered entirely from this attack, although he made practically a perfect recovery, so far as

the control of the muscles was concerned, the cerebral symptoms never disappeared entirely. There was always slowness of his mental processes, and one symptom, which was quite unusual, was excessive secretion from the parotid gland on the side opposite to the superficial lesion which he had. This was first noticed some weeks after the hemiplegia appeared, and persisted as long as he lived, which was 2½ years after his injury, and what he complained of more than anything else was an excessive flow of saliva. The case Dr. Bevan spoke of, where the clot was found in the brain substance, was undoubtedly one of late apoplexy, while in the cases which Dr. Allen described the clot was beneath the dura, but outside of the pia mater.

In the matter of the middle meningeal artery, this drawing shows that the middle meningeal artery has a main trunk within the skull, and surgeons who operate and expose this artery know that is true in almost all cases. And I would like to call your attention to the fact that in our English text-books on anatomy, we still have the old description which says that the artery divides immediately as it enters the skull at the foramen spinosum, consequently leaving no main branch within the skull. In examinations of one hundred arteries, fifty skulls, examining the artery on both sides, that was true in 5 per cent of the cases. In the other 95 per cent there was a main trunk within the skull, and that is the rule and not the exception.

In regard to the presence of this bony canal which Dr. Allen spoke of, I have found it in 60 cases out of 100. These skulls were taken from the dissecting room and were those of people advanced in life. Possibly in younger individuals the canal would not be found in such a large proportion of cases.

Dr. Hugh T. Patrick: I can contribute nothing of value to the discussion of this subject. I have never seen a case of the type so well described by Dr. Allen. I can recall some cases in which peculiar symptoms began a considerable time after traumatism of the head, but cases with distinct symptoms of compression, with hemiplegia or distinct local paralysis, I have not seen.

The thing in this paper that has disturbed my mind is the pathology. What caused the pressure, or what started it? Obviously it was not a second hæmorrhage, or a superficial *späta poplexie* to which Dr. Plummer alluded. Even this so-called late apoplexy has not been adequately explained. Two cases beautifully reported by Allen, of Philadelphia, throw doubt on the originally proposed pathology.

One thing that struck me in the table here presented is that most of the typical cases, especially the two characteristic cases of the essayist have been in patients well along in years. We know that the cerebral circulation in people advanced in years is sometimes a fearfully and wonderfully managed affair, and it seems to me more reasonable that this sort of thing would be apt to happen in those advanced in age, but I cannot explain it.

A thing I would like to see carried out is what Dr. Walton, of Boston, has urged, namely, in operating on brain cases it is much safer, if there are localizing signs, to follow these localizing signs in looking for the lesion, rather than be guided by the point where the injury was received. I think that is about as good gospel as anybody could have in operating on the head. To be sure, one may miss the lesion even then and have to operate at both sites. Of course, there are some signs which appear to be localizing signs, which are not of any focal value. For instance, paralysis of the sixth nerve is of little or no localizing value, although it is a localized trouble. But there are cerebral localizing signs which are more valuable in locating the place where the trouble is than is the point where the external violence was received.

A word as to the point of rigidity on the affected side, to which Dr. Allen has alluded. That is a characteristic thing, not only in traumatic cases but in others as well, and is indicative of a surface lesion. It is not found frequently in deep hæmorrhage, in ordinary cerebral apoplexy.

Just one other little hint or addendum to the essay. The essayist alluded to diminished respiratory excursion of the chest on the paralyzed side. This was first noted by Hughlings Jackson, but applies only to ordinary tranquil respiration. It does not apply to forced inspiration, nor to spasmodic inspiration or abnormal inspiration, such as occurs in people in coma, and it does not apply to forced voluntary inspiration.

Dr. Archibald Church: It has occurred to me in listening to this paper that, perhaps, if the title had been a little more restricted, it might have been an advantage. As the table of cases indicates, these are instances of meningeal hæmorrhage, not necessarily of the midal-meningeal artery, but of meningeal location.

When I first received an outline of the paper I immediately called to mind the late apoplexy of Bollinger, and was in hopes of hearing something said of it, because these cases frequently are very important. Not so long ago there was a case in court in which a man sued a public utility corporation for a hemiplegia which came on in the manner of an ordinary apoplectic stroke about six weeks after he had been jostled. In trying

to get out at the door the motion of the car threw him against the doorpost, so that he bumped his head. There was very little evidence of injury to the head, merely a lump. Two weeks later he became paralyzed, and this late apoplexy was attributed to the jolting.

As Dr. Bevan has pertinently suggested, in some of these cases it is not unlikely the operators were dealing with a pachymeningitis hæmorrhagica, which is particularly common among men of the third, fourth, and fifth decades of life, especially if they are alcoholic in their habits. These cases in which we find laminated clots, or more or less organized layers of blood within the skull, or within the dura particularly, manifest in their clinical phase advancement and recession of symptoms, so that we may have at the end of a period of days or weeks, some advancement in paralytic manifestations, or convulsions, or rigidities, that may also be associated with slight traumatism or serious head injury.

The dictum that we should be guided by the cerebral symptoms in exploration of the skull contents, with perhaps comparative disregard of the external evidences of injury, is not always a safe rule. About two months ago there was admitted to St. Luke's Hospital a man accustomed to drinking heavily, and after being on a spree for a number of hours he was seen to fall on the street. He was brought into the hospital by the police, and they at first got the idea he had been slugged, but witnesses who saw him fall were interrogated and said there was no "hold-up" about it. In the fall he received a contused wound over the left eye, and was in a peculiarly apathetic sort of condition. The next day it was found that the left side of his body was lacking in its functional control. He dragged the left leg and used the left arm with uncertainty. He talked plainly but was very much confused. He would sink into a comatose state and then brighten up. After one of these comatose conditions he brightened up to such an extent that an operation, which had been advised and planned, was postponed. When he became comatose again and showed Cheyne-Stokes respiration, an operation was done on the right side corresponding to the symptoms, but nothing was found beneath the dura. The convolutions and pia looked "œdematous." The man brightened after the operation, but gradually relapsed into a comatose condition which deepened until finally he died without regaining consciousness. This last period of coma was attributed in part to the operation. Upon post-mortem examination, on the left side under the location of the brow injury, a subdural hæmorrhage was found, not a massive one, but one which affected decidedly the frontal lobe. If the operation had been done at this site, perhaps his life might have been saved. As a rule, we should not only operate on the side indicated by the nervous symptoms, but also operate upon the side which has evidently received the violence.

In regard to the case Dr. Murphy has shown. I may say that a year ago the boy was examined by my friend, Dr. Hecht, who said the patient presented symptoms of brain tumor — vomiting, choked disk, headache, and decided ataxia, and properly an operation was recommended, consented to, and done by Dr. Schroeder. The operation was done upon both sides of the cerebellum, which was examined as to the lobes and in the cerebello-pontine angles, without discovering a tumor. A week later the head was again opened on the right side, but they found nothing pathological. Within a few weeks over the left opening a tumor formed, which was as large as an orange. This continued to increase slowly until it seemed as though the integument would be burst at any moment by the extreme tension of the contents. Pressure over the tumor caused headache. I suggested spinal puncture, because there was a suspicion of new growth, or brain hernia. The object of spinal puncture was to see how much reduction could be effected in this apparently fluid tumor. As Dr. Murphy has said, about an ounce of fluid was withdrawn from the spinal spaces without reducing the size of the tumor, but reducing its tension somewhat, and within forty-eight hours it was amazing to see an excavation where there had been an immense tumor. The patient has not been benefited by the spinal puncture very materially, but the case is very instructive.

I believe that in most of the cases reported to-night where fluid contents are found in meningeally located hæmorrhage long after the date of injury, the symptoms presented are secondary to a new osmotic condition which is developed in the course of time by agencies with which we are not entirely familiar.

DR. ALLEN (closing the discussion): In connection with the remarks of the last speaker (Dr. Church), I will say that case 26 was one of injury on one side of the brain. There was hæmorrhage on one side, and the symptoms were upon the same side. The patient was operated upon the opposite side, and at the post-mortem examination it was found the fibres did not cross over. Several cases of that sort are reported.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF SURGERY

UNDER THE CHARGE OF

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Surgery of the Bile Passages with Especial Reference to the End Results. JOHN C. MUNRO, M. D. *Boston Medical and Surgical Journal*, March 25, 1909.

An analysis of our cases demonstrates that jaundice is present in a majority of all — even the simple gall-bladder cases — at some time and that a very large majority of common duct cases have jaundice.

2. That the pancreas is not infrequently pathological as determined by examination of the open abdomen.

3. That adhesions are present in a large majority of cases and may be the direct cause of the symptoms, rendering all medical treatment more than futile.

4. The pulmonary complications must be reckoned with in the prognosis, but that they are less frequent than anticipated.

5. Cholecystostomy is normally a more suitable operation than cholecystectomy, unless the gall-bladder is definitely functionless.

6. Recurrence of symptoms may be due to adhesions or a contracted gall-bladder as well as overlooked stones.

7. Toxæmic cases are best treated medically until the acute stage is passed.

8. That fatal capillary hæmorrhage may be controlled to any extent not yet determined, by fresh animal serum.

WM. R. CUBBINS.

Surgical Treatment of Cancer of the Bladder. ARTHUR T. CABOT, A. M., M. D. *Boston Medical and Surgical Journal*, January 21, 1909.

The author reports one case in full and draws conclusions from others. The diagnosis is made most certainly with a cystoscope, but the continued pressure of blood, painful micturition, and the presence of atypical cells in the urine are regarded as very valuable aids.

Dr. Cabot believes that papillomata are more frequently the forerunners of carcinomata than they are usually supposed to be, and he regards it as essential to inspect the base of each papilloma to see if it is or is not adherent. If free, and the mucose a can be drawn up in a fold, thereis little if any danger of a recurrence, but if the fold is not free the excision should be radical.

The transperitoneal route is strongly advocated because of the ease with which the bladder can be reached. It is especially serviceable in fundal tumors but the author believes that it can also be utilized for tumors of the base. Where ureters are to be interfered with he advises an implantation into the fundus. Where a tumor is inoperable, so far as complete removal is concerned, be believes that a thorough currettage and cauterization will be of marked advantage.

WM. R. CUBBINS.

Mixed Tumors of the Cheek and of the Lips. (Tumeurs mixtes de la joue et des lèvres.) LENORMANT, RUBENS, DUVAL ET COTTARD, LETULLE, GAYET. *Archives Générales de Chirurgie*, March, 1909.

This article is based upon two personal cases in which a detailed study of the anatomical changes was made. These authors were able to collect 28 cases of mixed tumors of the lip, 10 cases of tumors of the cheek. In all of these the tumors presented great analogy in structure to each other and to mixed tumors of the salivary glands and of the velum of these palati.

The authors believe that these tumors result from branchial inclusions. They further state that the existence of labial and genial tumors situated upon the exact line of the embryonal facial fissures constitutes an important argument in favor of the branchiogenic theory of mixed parabuccal tumors.

Letulle in reporting three tumors of the lip, one of which was a salivary adenoma with congenital cystic formation; the second, a mixed tumor of the type of Reverdin-Mayor; the third, which the authors describe in detail, was composed of vesicular cells forming a tumor isolated from the surrounding tissues. The center of this tumor had undergone secondary degenerative changes; it was liquefied, constituting a sero-albuminous cyst.

Such a tumor of connective tissue origin and nature is not a sarcoma, an endothelioma, or a perithelioma. It is a pure embryonic conjunctivoma.

The prognosis is favorable as these tumors do not recur after extirpation. Gayet reports the case of a young man from whom he extirpated a small solid tumor situated in the naso-genial groove. This tumor was suggestive of a sebaceous cyst with calcified contents. The histological examination showed that the mass was an adeno-fibro-chondroma, a mixed tumor

related to an anomaly of the fronto-maxillary fissure. If fistulæ, cysts dependent on an anomaly of this fissure are frequent, solid tumors are rare, especially in the naso-genial region, which corresponds to the inferior extremity of the maxillary fissure. The seat, the structure, of these tumors shows that they are not of salivary origin, they are branchiomata.

AIMÉ PAUL HEINECK.

Serum Therapy in Exophthalmic Goiter. (Um Tratamento Sorotherapico Do Bocio Exophthalmico.) SILVIO REBELLO. *Jornal da Sociedade das Sciencias Medicas*, Lisbon, Portugal, vol. lxii, No. 1, 1908.

The author gives a preliminary report of his work, not yet completed. Starting with the assumption that Basedow's disease is an autointoxication due to hypersecretion of the thyroid, he directs his treatment toward two ends, namely:

1. The neutralization of the toxins secreted, and
2. The lessening of the secretory activity of the gland.

The thyreoglobulin and the nucleoproteid are extracted from fresh human thyroids and injected into animals whose blood serum forms antibodies and acquires a specific cytolytic or thyreolytic action.

The serum was tried on six cases showing the complete classical clinical picture of Basedow's disease. One patient was treated with an autoserum after partial thyroidectomy for Basedow's disease; in this case the preparation of the serum was very difficult, owing to the extreme susceptibility of the animals to this particular gland, but the formation of the antibodies was found to be especially abundant.

Injections began with ½ c.c. of the serum, with the following results: There was an immediate temporary rise of temperature of about 1 degree; this was accompanied in some cases by a period of excitement; in others by depression amounting almost to melancholia. There quickly followed a decrease in the tachycardia, the pulse rate dropping from an average of 120 to about 80; in no case did the pulse return to its former rapidity. There was also a marked decrease in the functional disturbances of the heart, dyspnœa, etc. The exophthalmos and tremor were markedly alleviated. The gland decreased sensibly in size, except in one case in which it became larger, with improvement in the other symptoms. The local effects were limited to a slight erythema and œdema, which yielded readily to hot applications. There was usually a slight transitory albuminuria, but the urine in no case showed any hæmoglobin.

The author concludes:

1. The serum has a specific cytolytic effect on the thyroid gland.
2. The action seems to be both antitoxic and secretion-regulating.
3. There is no hæmolytic effect whatever.
4. The serum has a definite therapeutic va.ue.
5. The serum is valueless unless made from fresh glands.

B. J. O'NEILL, JR.

Plastic Surgery of Blood-Vessels. ISAAC LEVIN. *Annals of Surgery*, March, 1909.

Levin carried out a series of experiments on the transplantation of devitalized arterial segments, using the technique described by Carrel.

Series 1. Segments of the abdominal aorta of cats and dogs were placed in boiling water for a few minutes and then transplanted into the abdominal aortæ of the same species. Two cats and two dogs were used.

Series 2. Segments of a human ureter were fixed in 4 per cent formalin and then transplanted into the abdominal aortæ of two dogs.

Series 3. Formalin hardened segments of aorta of the same species were transplanted into the abdominal aortæ of two dogs and two cats. The segments selected were of the same size as the aorta of the host.

Series 4. Segments of thoracic aorta of a dog were hardened in formalin and transplanted into the abdominal aortæ of two dogs.

RESULTS

Series 1 and 2. Circulation in the femoral ceased soon after operation. The autopsy in each case showed marked narrowing of the lumen of the implanted segment.

Series 3. The implanted segment was found to be smaller than the aorta of the host in each case. Thrombosis and death occurred in all the cases.

Series 4. The dog did well for ten days, with normal pulsation of the femorals. The abdominal wound opened on the eleventh day and the animal died of infection.

The other dog showed normal pulsation of the femorals for ten days. On the eleventh the dog was anæsthetized in order to dress the wound, and died in a few hours, apparently from the ether. The distal end of the segment was free from thrombus; over the proximal suture line there was a large, thin parietal thrombus.

Levin concludes that a segment of vessel need not necessarily be lined with living epithelium in order that the blood passing through it remain fluid. He find that since hardened vessels are not elastic, the implanted segment must have a lumen somewhat larger than that of the host.

Levin also describes a transfusion clamp which he has used to advantage.

Extensive Hæmorrhage from the Kidney. (Ueber renale massen blutungen.) TH. BLEEK. *Beit. z. Klin. Chir.*, b. 61, h. 2.

Bleek reports clinical cases, and analyzes carefully the literature dealing with kidney hæmorrhages, and as a result of his study he points out that in unilateral bleeding, it is important to bear in mind that the hæmorrhage may be due to nephritis. It is essential, of course, to determine whether stone, tumor, or tuberculosis is not an etiological factor, before one decides on the diagnosis of Bright's disease. It must also be borne in mind, that despite all of our modern aids to kidney diagnosis, it is often impossible to be certain of the exact state of affairs, until the kidney

has been exposed by operation. It is undoubtedly true that the so-called essential hæmaturia, without any demonstrable changes in the kidneys, does occur, but this diagnosis can only stand in those cases where both kidneys have been examined microscopically.

When the etiological factor of the hæmorrhage is unknown, it is permissible to resort to internal treatment. Operation, however, should not be delayed too long, lest a serious condition might become irreparable as a result of ultra conservatism. If an operation is undertaken with the view of exploration, it is always advisable to do a nephrotomy. This holds true, even in cases of bleeding due to floating kidney, or chronic nephritis, where the temptations might be great to rest content with either simple nephropexy or de capsulation. When nephrotomy is done, a piece of the kidney should always be excised for microscopical examination. It is true that nephrotomy is sometimes followed by undesirable consequences; but these factors are more than counterbalanced by the cessation of bleeding and relief from pain which follows bisection of the kidney. Nephrectomy is never to be practiced primarily in cases of unilateral kidney hæmorrhage, where no cause for the bleeding cannot be discovered. It may be done as a secondary operation, if nephrotomy fails to give relief, and if it can be demonstrated that the other kidney is functionally sound.

M. G. SEELIG.

Hyperæmia of the Thyroid Gland. (Congestions thyroïdiennes.) BÉRARD. *Gazette des Hôpitaux* No. 135, *Archives Générales de Chirurgie*, March, 1909.

Like a true vascular sponge, the thyroid body reacts to all forms of hyperæmia, active or passive. The author reviews different causes of congestion; establishment of the menses, sexual excitement, pregnancy, parturition, prolonged strains, attempts at strangulation, hyperextension of the head.

The pathological anatomy of thyroidal congestion is not well known. During its first stage, the congestion is characterized by a dilatation of the capsular vessels; in the acute and massive hyperæmias the periphery of the gland gives the impression of a sponge saturated with blood; the central portion showing prominent lobules, separated by lacunæ filled with blood.

Microscopically there is a noticeable diminution of the colloid present in the vesicles, while the intra- and perilobular lymphatic vessels are full of it. In the interlobular connective tissue space, interstitial hæmorrhages can be seen. Thyroid congestion and its consecutive histological changes have frequently been determined experimentally. Congestion may be acute, may be chronic. The acute form is followed by marked circulatory activity in the gland and by hypersecretion of an incompletely elaborated product.

In chronic congestion there is, in association with dilatation of the capillary vessels, an abnormal proliferation of all the structural elements of the gland.

Clinically, the constant symptoms are swelling of the neck. The gland can be felt increased in volume soft, slightly painful.

Thyroid congestion, if of frequent occurrence or of long duration, leads to a permanent hypertrophy of the gland.

In diagnosing the condition one has to exclude acute thyroiditis, hæmorrhage into a small cystic goiter rapidly developing cancer of the gland. In the new born, in whom the most prominent symptom is asphyxia, an attempt must be made to see if the symptoms are not due to a hypertrophic thymus.

AIMÉ PAUL HEINECK.

Immediate Intervention and Operative Technique in Gunshot Wounds of the Ear. (L'intervention immédiate et la technique opératoire dans les coups de feu de l'oreille.) H. SOLON. Thèse, Paris, 1908, *Archives Générales de Chirurgie*, March, 1909.

Gunshot wounds of the ear are habitually followed by a consecutive infection of the traumatized region. They usually involve organs, the infection of which is very much to be feared. Chief among these may be mentioned the organs of hearing, the facial nerve, the jugular vein, the carotid artery, and the meninges. Their treatment calls for: First, thorough disinfection followed or not, according to the feasibility in the case at hand of the immediate and direct removal of the missile. The first care must be given under the immediate control of sight. By acting blindly in the depths of the auditory canal one is liable to inflict injury. All examinations and all deep forms of treatment should be made with the aid of the best possible light, and with all the adjuvants employed in otoscopy. If the bullet cannot be immediately seized and removed from the auditory canal, operation should be performed as early as possible as warranted by the patient's general condition.

The reading over of the observations that have been collected shows that the presence of the bullet perpetuates suppuration, annihilates labyrinthine audition, and can permanently destroy the facial nerve by infection secondary to the suppurative inflammation. A suppurative inflammation in the wounded area can determine an erosion of the large vessels (the carotid, the jugular), a meningo-encephalitis. Before proceeding with surgical intervention, it is well to ascertain, if possible, the situation of the or the projectiles. Recourse will be had to direct otoscopy, to radiography.

The method of choice for the intervention consists in seeking the bullet by the retroauricular route with or without evidement of the petromastoidal spaces, with or without invasion of the supra-, sub-, or preauricular regions. The preauricular and the supraauricular routes are methods of exception, the employment of which is rarely indicated. Immediate intervention will be resorted to in all cases in which the presence of a foreign body in the ear is demonstrated. The complications of these gunshot wounds should hasten the performance of the appropriate surgical measures, instead of contraindicating operative intervention.

AIMÉ PAUL HEINECK.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF GYNECOLOGY

UNDER THE CHARGE OF

J. Clarence Webster, M. D.
J. C. Hollister, M. D.
Gerry R. Holden, M. D.
E. C. Dudley, M. D.
Geo. De Tarnowsky, M. D.
Carey Culbertson, M. D.

Extraperitoneal Cæsarean Section. (Der extraperitoneale Kaiserschnitt.) W. Latzko. *Wein. Klin. Wchnschr.*, 1909, xxii, 477.

Latzko after a thorough review of the literature takes up the three distinct operations performed. The first, that of Frank, where the peritoneum is divided, then the two edges sutured together, the uterus then being opened. Second, that of Sellheim, where the peritoneum is stripped upward off the bladder and anterior surface of the uterus. Third, his own method in which the bladder is retracted to the right and the peritoneum stripped upon the left side and the uterus then opened.

Against Sellheim's operation he urges the fact that almost without exception the peritoneum tears when being stripped off the bladder and uterus.

The two dangers of extraperitoneal Cæsarean section are infection of the cellular tissue, and a subsequent scar. Of 150 cases reported only 8 cases died of sepsis. In none of the case did the child die. As to the danger of cervical scar causing trouble in later pregnancies, we may point to the experiences in vaginal Cæsarean section.

TABLE OF INDICATIONS

	Probably infected	Doubtful	Probably clean
Disproportion Grade I. Pluriparal.	Pubiotomy.	Pubiotomy.	Extraperitoneal Cæsarean Section.
Disproportion Grade I. Primiparal.	Perforation.	Extraperitoneal Cæsarean Section.	Extraperitoneal Cæsarean Section.
Disproportion Grade II.	Perforation.	Extraperitoneal Cæsarean Section.	Extraperitoneal, finally classic Cæsarean Section.
Absolute Disproportion.	Porro Operation.	Extraperitoneal Cæsarean Section.	Extraperitoneal, finally classic Cæsarean Section.

In Grade I the bony pelvis contains a portion of the skull, and the latter is hindered from passing by the promontory.

In Grade II the head remains movable above the pelvic rim even after strong contraction.

Latzko gives the following advantages of the extraperitoneal Cæsarean section:

1. It is independent of the degree of local disproportion. This it has in common with the classic Cæsarean section, but the latter is confined to a proportionately few aseptic cases.
2. It is an operation of delivery and not like pubiotomy, an operation to enlarge the passages.
3. It allows the natural powers of labor the longest interval of time, and is therefore in the best sense a conservative operation.
4. One has complete control of its technique in all eventualities, which cannot be said of pubiotomy.
5. There is less danger of wounding the surrounding tissues than in pubiotomy.
6. It is as a simple wound of the soft parts, probably less dangerous than pubiotomy communicating with a vaginal wound which according to Frank's opinion is to be regarded as a compound fracture.

C. G. Grulee.

The Influence of Hysterectomy on the General System of Women. (Welchen Einfluss hat die Entfernung des Uterus auf den Gesamtorganismus der Frau.) Pankow and Rauscher. *Zentrbl. f. Gyn.*, No. 42, 1908.

These authors report the results of their studies of post-operative cases at the Jena and Freiburg clinics, Krönig's material. They emphasize the fact that, in each individual case, the anti-operative clinical history has been very carefully recorded. This is rendered necessary because the marked difference in the conclusions of the earlier investigators is due to the omission of such records. In deducing conclusions, cases naturally group themselves into two divisions: those in which the patients possess sound, and those where they have unhealthy, nervous systems. Furthermore, a sharp distinction must be made between molimina menstrualia occurring periodically and omission symptoms proper. Only when catamenial disorders were present before operations have Pankow and Rauscher observed molimina menstrualia as post-operative phenomena. Molimina occurring for the first time after operation, or even becoming more troublesome at that time, were not observed.

On the other hand, menopause symptoms not directly connected with the periods were often seen, differing from the menopause after castration in being less severe and in causing least of all trouble in young persons in whom symptoms after castration are most marked. They resembled more nearly the usual symp-

toms of the normal climacterium. As most of the patients were women approaching the menopause, it is probable that in such cases the same symptoms would have come on without operation. In some cases, however, where these symptoms occurred at once after hysterectomy, they were undoubtedly due directly to the operation. Pathologic obesity and genital atrophy were not observed. The blood showed various changes. It would appear that frequently occurring hæmorrhages, even if not very profuse, may cause more irreparable damage than a severe loss of blood at one time. The blood-producing organs seem to gradually fail in their reactive powers.

The effect on sexual feeling is certainly not definitely unfavorable, though there is found to be a considerable variation in this respect. Rather should it be said that any general improvement is attended by a corresponding change in the sexual condition as well.

CAREY CULBERTSON.

The Correlation of Function of the Glands of Internal Secretion. DR. STEFANO REBAUDI. *La Ginecologia Moderna*, Genoa, December, 1908.

The fact that removal or disease of one or more glands of internal secretion (thymus, thyroid, parathyroids pituitary body, suprarenals, pancreas, testes, ovaries) is prone to cause a compensatory hyperactivity of the remaining glands, led Rebaudi to institute an exhaustive series of experiments on animals (dogs, cats, guinea-pigs). These animals were subjected to ovariectomy under aseptic precaution and killed at intervals varying from five days to a year from date of operation.

The pancreas was first studied and it was found that within two weeks from the date of the double ovariectomy, a gradually progressive hypertrophy and hyperplasia of the isles of Langerhans (which are believed to be the main, if not the only, seat of pancreatic secretion) was noted.

Rebaudi arrives at the following conclusions:

1. There exists a correlation of function between the genital glands and the islands of Langerhans of the pancreas.

2. In the absence of the internal secretion of the genital glands, the isles of Langerhans increased their function through hypertrophy, possibly in an effort to supplement or replace the loss of genital secretion.

3. The hyperactivity of the Langerhans bodies prove that they belong to the group of internal secretion glands.

4. If the isles of Langerhans are tissues having an internal secretion, we cannot, ipso facto, state that other parts of the pancreas may not also have an internal function. (The term "internal function" of the pancreas is here used to separate it from the "pancreatic ferments" which represent the external secretion of the gland.)

5. As to the exact nature of the function of the internal secretion of the pancreas, it is still unknown, though believed by some to deal with the metabolism of hydrocarbons.

6. The isles of Langerhans can be readily differentiated from the surrounding pancreatic acini; no transformation or transitional cells could be demonstrated between the one and the other.

Control experiments were made on animals ovariectomized, and then given injections of ovarian extract. These animals were subsequently killed in regular sequences and the pancreatic tissues subjected to microscopical examination. In none of these cases could hypertrophy or hyperplasia of the isles of Langerhans be demonstrated.

Experiments were next undertaken in order to determine, if possible, what part or parts of ovarian tissue were especially concerned in the formation of its internal secretion. Two series of animals were used; in the first series, the corpora lutei of both ovaries were destroyed with the Paquelin cautery and the animals were then killed at intervals varying from ten to thirty days. Sections of pancreatic tissue were made and examined. In the second or control series, the same destruction of corpora lutei was carried out, but the animals were given injections of extract of corpus luteum and then killed as in the first series.

The conclusions drawn from the above are:

1. In the absence of corpora lutei, the isles of Langerhans in the pancreas show increased activity.

2. The changes occurring in the isles of Langerhans, following destruction of the corpora lutei of both ovaries are essentially those observed after double ovariectomy.

3. It seems proven that the corpora lutei are organs of internal secretion and that they represent the main, if not the only, tissues of the ovaries having an internal function.

GEORGE DE TARNOWSKY.

Suppurating Post-typhoid Mammitis. (Mammite suppurée post-typhique.) H. ROGER. *Archives Générales de Chirurgie*, April, 1909.

The patient, 35 years of age, had, when six years of age, had typhoid fever. A year ago she nursed a child. She showed all the symptoms of a marked attack of typhoid fever with serious intestinal hæmorrhages and deep intoxication manifesting itself by vomiting, myocarditis, and dyspnœa of bulbal origin. During the course of her convalescence there appeared a tumefaction of the left breast. This was accompanied by an axillary adenitis which evoluted into suppuration. This breast abscess was incised and about a glassful of greenish pus was evacuated; the wound was drained; the patient recovered. Bacteriological examination of the pus was made and it was then seen that the infection was polymicrobic. A bacillus was isolated which was neither the colon bacillus nor Eberth's bacillus. It might have been a paratyphoid organism.

Typhoid mammitis is uncommon. The author has been able to find only 23 cases all together. In one of these cases the affection was bilateral; in one it coexisted with thyroiditis. Out of 24 cases only 10 suppurated. This affection occurs during the decline of the disease, less frequently during convalescence or when the patient is well. The suppuration is most always associated with the usual symptoms of fever. Cure is rapid after incision, preceded or not by an exploratory puncture.

Among the predisposing causes have been mentioned glandular congestion and previous lactation. The nature of the causative germs has not been absolutely determined. It seems that at times the infection is due to the staphylococcus pyogenes, at times to the bacillus Eberth. AIMÉ PAUL HEINECK.

Cold Tubal Abscesses (Des abcès froids tubaires). H. ALBERTIN. *Lyon Chirurgical*, November, 1908.

The article discusses a form of tubal tuberculosis which differs very much from the other manifestations of tuberculosis of the adnexa. In the three cases which he reports, the women were young, from 20 to 30 years. There had been no previous genital infections, gonococcic or post-abortum. The infection began insidiously, at the onset, it was unnoticed. Infection grows rapidly in these cases. It may be the previous condition of the tubes or a greater resistance modifies the clinical and anatomical manifestations of the disease. It may be that cold abscesses follow directly upon a tuberculous hydrosalpinx. For distention of the tubes two conditions must be realized. First, there must be a closure of the abdominal tubal orifices; there must be an absence of all previous lesions of the tube. The mucosa and the peritoneum must be absolutely normal if the tube is to distend.

Anatomical lesions are typical. Both tubes are generally involved. Their volume is enormous. Their shape resembles that of a bagpipe bound to the uterus by an elongated pedicle. Their external surface is smooth and adhesions are absent. The ovary may be entirely sound. The contents of the abscess is a puriform liquid. Histologically in the structure of the tube can be found all the elements of undoubted tuberculosis.

The symptoms are insidious, the evolution is slow.
AIMÉ PAUL HEINECK.

Primary Ovarian Actinomycosis. FRANK E. TAYLOR AND WELBY E. FISHER, F. R. C. S. *Journal of Obstetrics and Gynæcology of the British Empire*, May, 1909.

The authors point out that actinomycosis of the ovary constitutes one of the curiosities of gynecology, only six cases of this condition being on record. In none of these had the ovary been the primary seat of infection, but had been infected by extension of the disease originating either in the intestines or in the vagina, uterus, or Fallopian tubes. In this case, however, the writers claim that the ovary was the primary seat of the disease. The patient was a cook, aged 34, single, and was admitted to the hospital complaining of abdominal pain. The periods were irregular and very profuse. Pain was first noticed three and one-half years before, and soon after she became troubled with night sweats which had continued up to admission. About this time examination revealed an enlarged right ovary, but the patient refused operation. Pain and discomfort continued intermittently, and at one time she passed blood and pus in the urine. Marked anæmia and loss of flesh finally led the patient again to enter the hospital. She was then found to have a tumor the size of a child's head, filling the pelvis. There was no tenderness, but the tumor was fixed. The temperature was raised. The tumor was removed, when it was found to be very adherent to the surrounding parts. Both tubes were occluded, and bilateral salpingo-oophorectomy was performed. The patient for a time was very ill, but she ultimately recovered, and left the hospital with a small sinus. Shortly after a large abscess burst, and a large amount of pus escaped through the sinus. At the present time she is fairly well, with hardly any discharge. The microscopical examination showed masses of streptothrix. CAREY CULBERTSON.

Histology of the Smaller Myomata. FLORENCE E. WILLEY. *Journal of Obstetrics and Gynæcology of the British Empire*, March, 1909.

Reference is made to the fact that the more recent theories have claimed that fibro-myomata originated by proliferation of the cells forming the coats of arteries or capillaries, and that the muscle fibres are arranged concentrically round a central vessel. Sections of young myomata, from 5 mm. diameter upwards, illustrate the following points:

1. That the proliferating cells in growing tumors are muscle cells. In sections from patients aged 30 to 40, with enlarging uteri, the areas of proliferation show less connective tissue in proportion to the muscle than is found in non-proliferating muscle bundles of the same uterine wall, and the muscle nuclei are oval to rod-shaped; whereas seedling tumors past the menopause consist largely of fibrous tissue, and the muscle cells have narrow, rod-shaped nuclei.

2. The cells which proliferate are not those of the vascular system, but cells common to the whole uterine parenchyma.

3. The shape of early growths is most various — depending on the direction of the muscle bundles concerned, rather than on any relation to vessels large or small. Capsule formation begins later, when the growing tumor assumes an oval or spherical shape.

4. Subperitoneal fibro-myomata often begin by proliferation of the muscle bundles immediately beneath the peritoneum, and capsule formation in these is first seen on the site adjoining the uterine wall.

5. In sections of 60 to 70 uteri of all ages a fibro-myomatous seedling has been found before puberty, and those in women past the menopause consisted largely of fibrous tissue.

The conclusion is that fibro-myomata arise as irregular patches of proliferation of muscle cells of the uterine parenchyma, which have no special relation to the vascular system. The cause of this proliferation is unknown, but the absence of growing tumors before puberty and after the menopause suggests some relation to the activity of the sexual organs.
CAREY CULBERTSON.

BOOK REVIEWS

DYSPNŒA AND CYANOSIS. By Professor Edmund von Neusser, M. D. Translated by Andrew MacFarlane, M. D. New York: E. B. Treat & Co. 1907.

This book is number one of Neusser's treatises on disorders of respiration and circulation, and takes up in a very complete and comprehensive way all the possible causes of dyspnœa and cyanosis.

The author's skill as a clinician combined with his enormous experience enables him to cover the ground completely, yet briefly enough to be of value to the busy medical man. HENRY W. CHENEY.

GENERAL SURGERY. THE PRACTICAL MEDICINE SERIES. By John B. Murphy, M. D. Chicago: The Year Book Publishing Company. 1909.

This volume, reviewing the advances of surgery during the past year by so eminent an authority, cannot but be helpful to every one who has to deal with this specialty in any way. It discusses, not alone the advances of interest to the surgeons, but also those which come within the scope of the general practitioner, and any one desiring a resume of this branch of medicine will not find any volume more satisfactory than this. It comprises over 600 pages.

HÆMORRHAGE AND TRANSFUSION. AN EXPERIMENTAL AND CLINICAL RESEARCH. By George W. Crile, A. M., M. D. New York and London: D. Appleton & Co. 1909.

In America to-day mere carpentry in surgery is past. This is no better exemplified than by the book published by Crile and his associates upon "Hæmorrhage and Transfusion." The volume is one dealing with the research of over eleven years which has been made in this field of the physiology of the blood and its relation to surgery, and by it Crile has not alone advanced the standard of surgery in America but has made famous a name that will always stand for that which is best in medicine. We trust also that it presages a saner appreciation of the possibilities in such books for the publishers, since that publishing house which fosters the publication of special monographs, thus establishing a reputation of being the producer of high class surgical publications, will in time be more than repaid for the temporary loss.

The book deals with experimental studies in the relation of hæmorrhage to shock and the proper method of combating it. The second portion covers the later investigations and contributions upon the subject of transfusion, and brings up to date the results of the studies upon transfusion and shock, hæmorrhage after illuminating gas poisoning, lymphosarcomata in dogs, and other malignant growths, tuberculosis and suppuration. He also has a chapter upon hæmolysis. The latter is a subject which we trust Crile will study more extensively in the future and give us the benefit of his wide experience in experimental work, that we may have more definite knowledge in regard to its relation to surgical diseases.

THE ORIGIN AND METHOD OF EXTENSION OF TUBERCULOSIS OF THE FEMALE GENERATIVE TRACT. By Albert Blau. Berlin: S. Karger. 1909. From the Paltauf Institute for general and experimental pathology.

In view of the divergent opinions held by various authorities concerning the origin and mode of infection in tubercular lesions of the female generative tract, Blau has undertaken certain experiments upon the lower animals and has compared his results with clinical observations in thirty-six cases in order to obtain, if possible, definite conclusions.

The majority of cases of tuberculosis probably originate by swallowing infectious material whereby the bacilli easily pass through the intestinal walls and into the thoracic duct to reach the circulation. The lungs are affected secondarily. The rapidity of this mode of infection is shown by the report of Ravenel where in 28 cases, bacilli were found in the lungs within 24 hours after they were taken in through the mouth. Primary infection of the lungs by breathing in dry tuberculous material is the exception.

While an ascending tubercular infection having its primary focus in the vagina has been described by older writers, its occurrence is highly questionable. The author was unable to find a single instance in his material. In this form, the possibility of transmission by coitus is important. It is conceded that the semen in a tubercular individual may contain virulent bacilli which are deposited upon the vaginal mucosa, but the infrequency of such infections shows that the vagina inhibits and arrests their growth. Primary tuberculosis of the lower genital tract is rare, because the secretions being of acid reaction interfere with the development of the bacilli. The thickened pavement epithelium of the vagina and cylindrical epithelium of the cervix prevent the germs from penetrating the tissues. The tubercular bacilli are not secretion parasites as are the gonococci and other pyogenic bacteria. The secretion serves only as a vehicle and it is necessary for the bacilli to enter the tissues before infection is produced.

The guinea pig, which is especially susceptible to the action of tuberculosis, was used in the experiments. The introduction of tuberculous material into the normal vagina caused no reaction in six cases. In another

series where the peritoneal cavity was infected, it was found very difficult to infect the vagina artificially. Only when the resistance of the tissues was lowered, as by the puerperal state or local traumatism, is the susceptibility to infection comparable to that occurring by way of the skin or peritoneum. In five out of ten cases of pregnancy, both the vagina and uterus became involved as a result of local infection.

In laparotomies, when the tuberculous material was injected by a syringe into the uterine cavity, no lesions were discoverable in the organ or the lower genital tract. If the injection was made into the uterine wall itself, a local reaction followed. If the animal was pregnant, a local infection occurred in fifty per cent of the cases.

Among the thirty-six cases reported from Chrobak's klinik, not a single instance of primary infection of the genital tract was observed. In 25 cases, the adnexa alone were involved, in 8, both uterus and adnexa were tuberculous. In 33 cases of tuberculosis of the adnexa, either alone or combined with uterine involvement, tuberculous peritonitis was present twenty-four times. In 3 cases, where the disease was limited to the uterus, the peritoneum was normal.

Blau closes his monograph by stating that primary infection is exceedingly rare and is explained by the occurrence of simultaneous infection of the vaginal mucosa near the cervix. The mode of extension is always descending and requires an especial vulnerability — puerperium or traumatism — and an increased virulence of the bacilli, before a local infection is possible. HERBERT M. STOWE.

VACCINE AND SERUM THERAPY. By Edwin Henry Schorer, B. S., M. D. St. Louis: C. V. Mosby Co. 1909.

In this book of 131 pages, the author has endeavored to present to the medical profession the present knowledge concerning vaccines and serum therapy, stated concisely and as accurately as possible.

Wright's method of determining the opsonic index, the subject of opsonins in health and disease, and the theories of immunity, especially the opsonic theory, are taken up in detail.

Infections in general are discussed briefly, since a good knowledge of the subject is obviously essential to a correct application of specific treatment.

The book is well written, of large type and demonstrates that the author is intimately acquainted with his subject, which is of such universal importance to physicians and surgeons. JAMES J. COLE.

DISEASES OF THE HEART. By James Mackenzie, M. D., M. R. C. P. London: Oxford University Press. 1908.

The book is well written and amply illustrated. The etiology and pathology of disease of the heart are almost entirely neglected, but it is gratifying that the subject is handled in a thorough clinical manner. The newer special apparatus for accurate diagnosis is fully explained and emphasized. The treatment is rational and complete. M. MILTON PORTIS.

BOOKS RECEIVED

DIGEST OF COMMENTS ON THE PHARMACOPEIA OF THE UNITED STATES. By Murray Galt Motter and Martin I. Wildert. Washington: Government Printing Office. 1909.

PHYSIOLOGICAL AND MEDICAL OBSERVATIONS AMONG THE INDIANS OF SOUTHWESTERN UNITED STATES AND NORTHERN MEXICO. By Ales Hrdlicka. Washington: Government Printing Office. 1908.

THE PRACTICAL MEDICINE SERIES. Volume III. The Eye, Ear, Nose and Throat. Edited by Casey A. Wood, Albert H. Andrews and Gustavus P. Head. Series 1909. Chicago: The Year Book Publishers.

CONFESSIONS OF A NEURASTHENIC. By William Taylor Marrs. Philadelphia: F. A. Davis Company. 1909.

A TEXT-BOOK OF PRACTICAL OBSTETRICS. By Egbert H. Grandin, M. D., and George W. Jarman, M. D. Philadelphia: F. A. Davis Company. 1904. Third edition, revised.

HANDBOOK OF OBSTETRICS. By R. Cadwallader, A. M., M. D. Philadelphia: F. A. Davis Company. 1908.

A TEXT-BOOK OF PRACTICAL GYNECOLOGY. By David Todd Gilliam. Philadelphia: F. A. Davis Company. 1908.

SPEZIELLE CHIRURGISCHE DIAGNOSTIK FUR STUDIENDE UND ARZTE. Bearbeitet von Prof. Dr. F. de Quervain. Leipzig: F. C. W. Vogel. 1907.

MORTALITY STATISTICS, 1907. Department of Commerce and Labor. Washington: Government Printing Office. 1909.

HANDBOOK OF DISEASES OF THE RECTUM. By Louis J. Hirshmann, M. D. St. Louis: C. V. Mosby Medical Book and Publishing Company. 1909.

ABHANDLUNGEN AUS DEM GEBIETE DER GEBURTSHLIFE UND GYNÆKOLOGIE. By Prof. Dr. W. Tauffer. Berlin: S. Karger. 1909.